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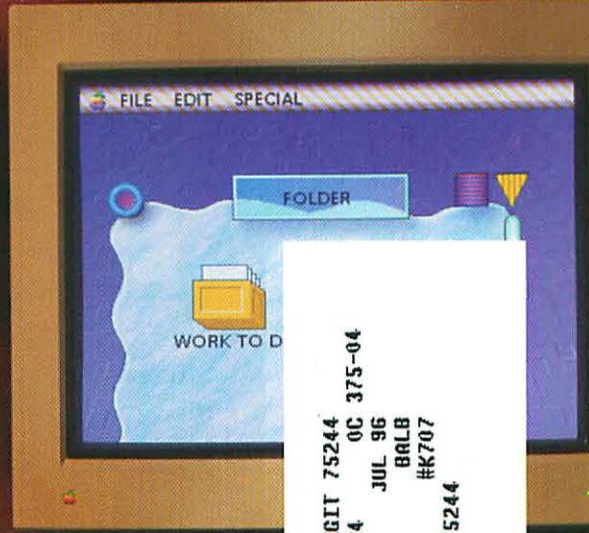
# Macworld

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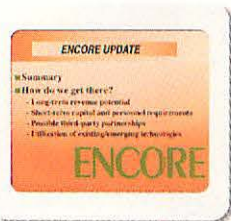


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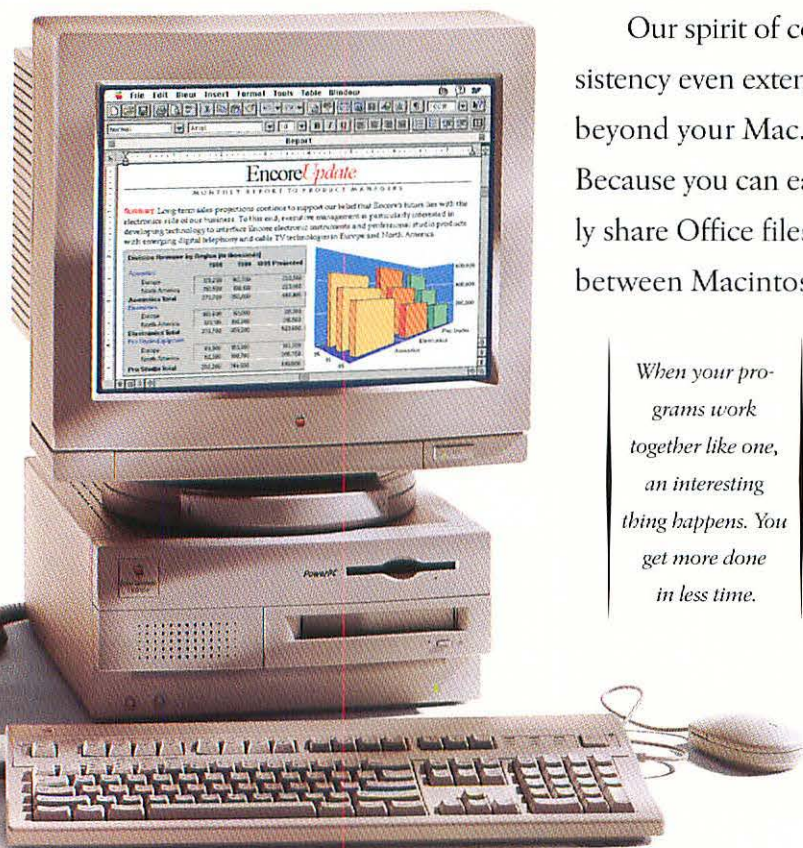
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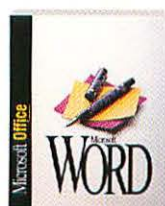
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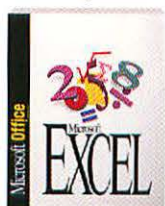
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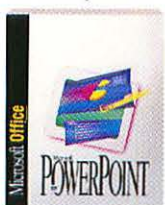
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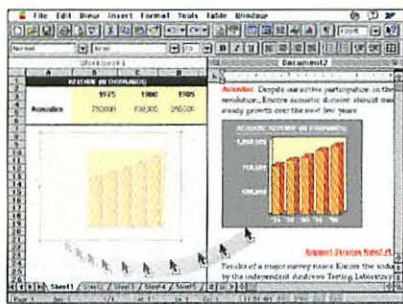
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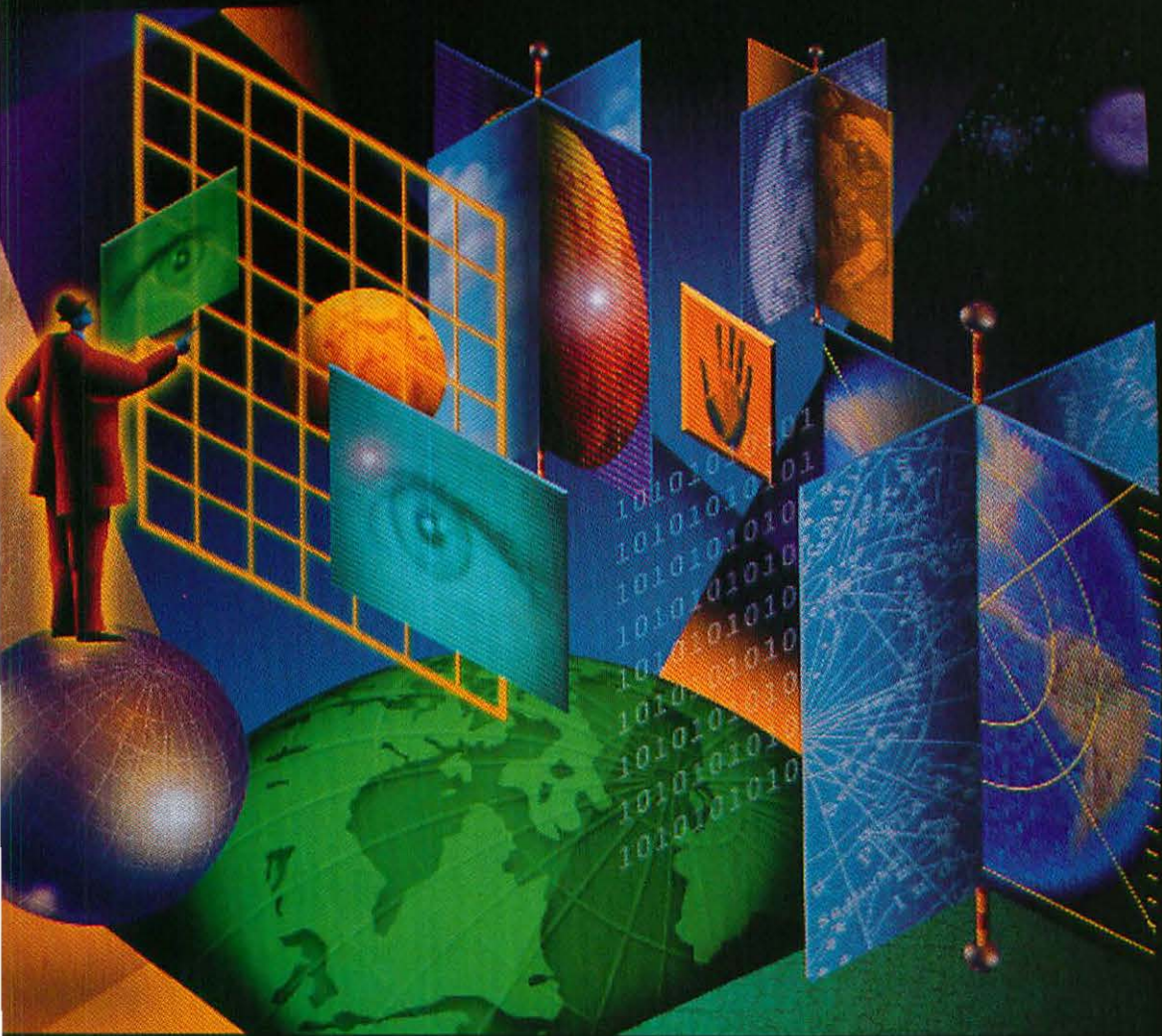
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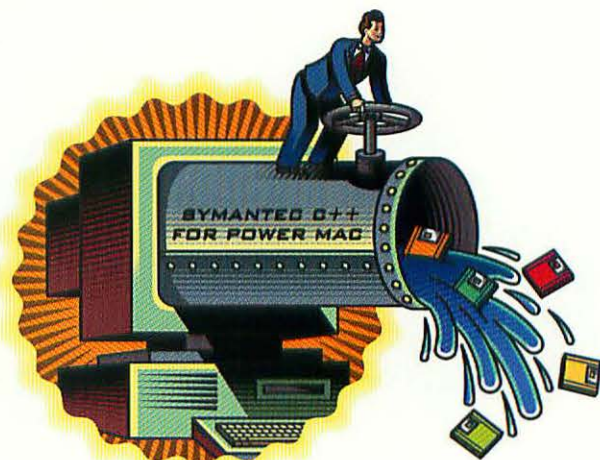
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*Photo by Stan Musilek.*

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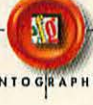
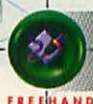
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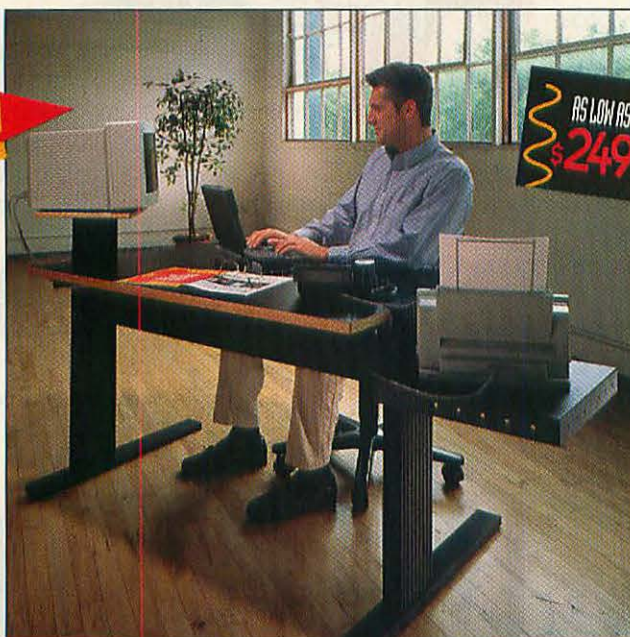
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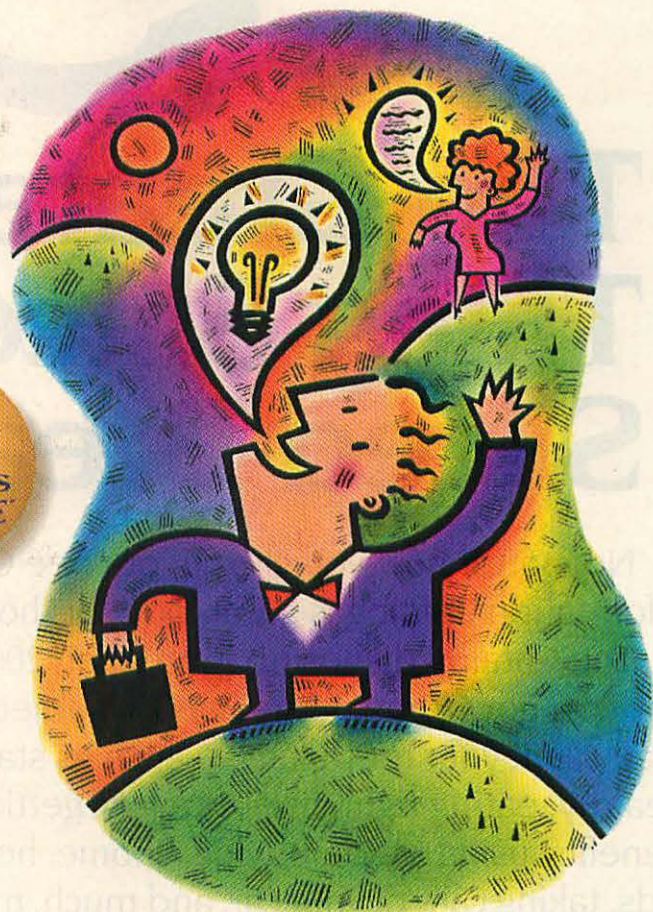
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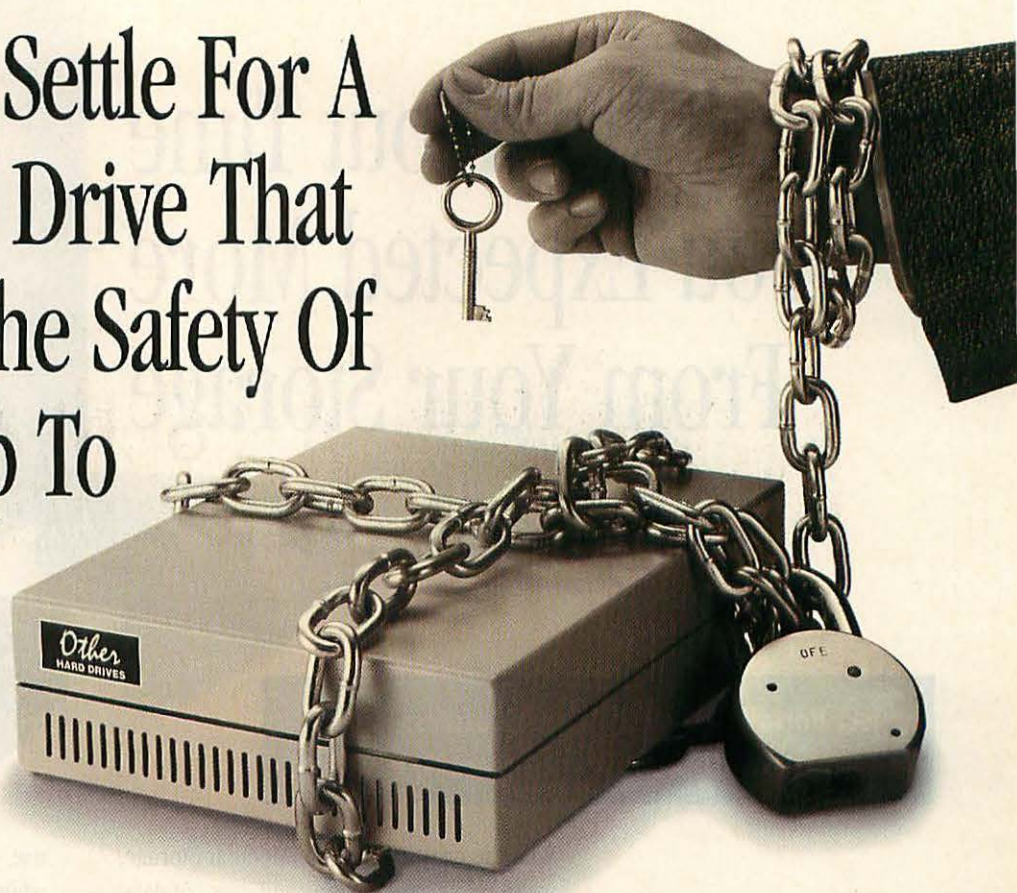
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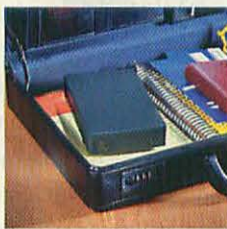
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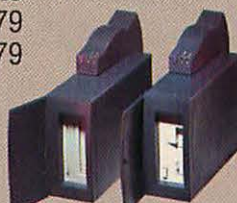
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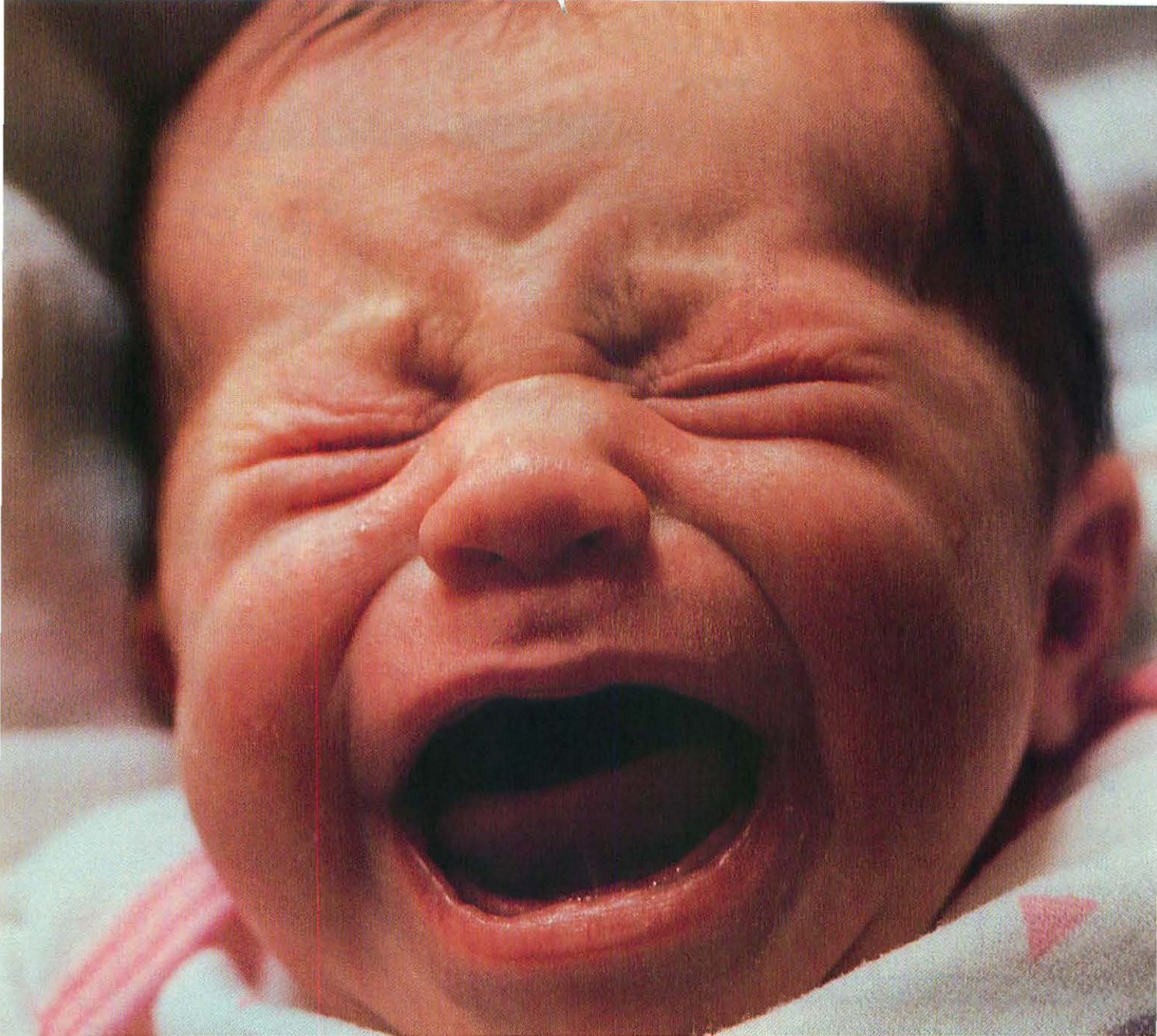


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# Map to the Future

*A field guide to the technologies transforming the Mac*

ONLY A YEAR SINCE THE MOST dramatic change to the Mac's architecture—the switch to the potent PowerPC microprocessor family—and already the ground is again changing underfoot. How's a Macintosh user supposed to stay current? How do you keep from losing your bearings when the path to the Mac's new greener pastures is marked by terms such as *Copland*, *Gershwin*, *clones*, *CHRP*, *PCI*, *OpenDoc*, *QuickTime VR*, and *QuickDraw 3D*? If you're befuddled by all this change, you're not alone. To help guide you through, here's a sketch map of the new topography—showing the benefits and expected arrival dates of these developments. For deeper insights into the new technologies, I recommend some related articles from *Macworld's* in-depth advance coverage.

## Milestone 1: Clones

In the event that you've been in Antarctica and missed hearing about Mac clones, here's a quick review. A Mac clone is a computer produced and sold by a company other than Apple that can nonetheless use the Mac Operating System and the many applications written for it. Clones are now possible because, after ten years of going it alone, Apple finally decided to license the Mac Operating System. The first clones are here now, although initially there will be clones from only a few companies, including DayStar Digital, Power Computing, and Radius. Power Computing hopes to license its clone technology to other developers as early as this year. You can expect to see many more units down the line, but not until Apple licenses the Mac OS to a major computer maker like IBM, Dell, or Acer. (For more on clones, see the April 1995 *Macworld*.)

The presence of Mac clones signals more choice for Macintosh users. You will be able to buy Mac-compatible computers from companies offering different combinations of features for different prices. You might, for example, buy a less

expensive (if perhaps less elegantly designed) alternative to the Mac, or pay somewhat more for a clone configured to meet your special requirements. And you'll be able to buy clones through the mail or from a company that is set up to support your particular application or organization. Choice is great, but consumers will need to be even better informed than before to make the right choice. That's where we come in. Stay tuned as *Macworld* Lab tests and reviews each clone as it hits the market.

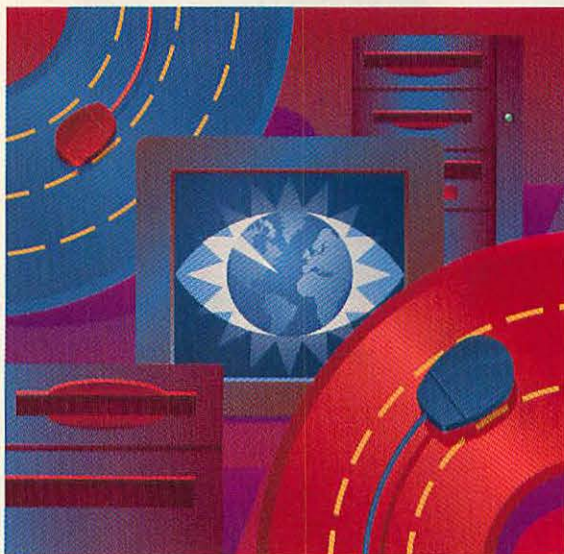
## Milestone 2: QuickTime VR and QuickDraw 3D

The Mac's next landmarks are the recently announced twin media technologies, QuickTime VR and QuickDraw 3D. QuickTime VR is a tool that lets developers cre-

possible. The only cloud over this happy scene is that Apple is charging developers an arm and a leg to use it; that may discourage adoption and slow the release of titles. That would be a real shame and a disservice to consumers, because once you see a nice QuickTime VR application, you'll never want to go back to regular CD-ROMs. (See the feature story "VR: QuickTime's New Edge," in this issue.)

We now take for granted the ability to cut and paste graphics between applications. Apple made this possible when it introduced the PICT file format with the original QuickDraw. But PICT works with two-dimensional graphic images only. QuickDraw 3D will enable you to transfer 3-D images between applications through a new, 3-D Clipboard. Editable 3-D imagery may soon be as common as

2-D graphics, giving Mac applications a new dimension (although most interface designers aren't convinced that they can in the near term create 3-D interfaces that add much value). Users should be able to get hold of QuickDraw 3D by the end of summer. After that it will be included on new Macs and be rolled into the next system software update. (For more on QuickDraw 3D, see *News*, May 1995.)



## Milestone 3: PCI

You know how trash collectors are sometimes called sanitation engineers?

Welcome to PCI, for Peripheral Component Interface—a highfalutin way to say "expansion bus." The next generation of Power Macs, purportedly due sometime this summer, uses PCI instead of NuBus, the Mac's primary bus standard since 1987. PCI slots require PCI cards, so when you go to buy an add-in card, take care that you don't accidentally purchase a NuBus card.

PCI is potentially two to three times as fast as NuBus, which could speed up

ate realistic virtual environments for users to explore, in which you make real-time decisions as if you were walking around inside an actual building, national park, starship, or human circulatory system. QuickTime VR will usher in a new class of CD-ROM titles that are more engaging than what's currently available—ones that virtually set you inside your own interactive movie.

At this writing Apple was readying to release the developers' tool kit that will make QuickTime VR-based CD titles

*continues*



applications such as 24-bit video, motion-video editing and playback, network transfer, and Internet access. The other advantage to PCI is that many PCs also use it; this may lead to lower costs and greater choice. (See the feature story "Why PCI," June 1995.)

Ah, if only it were that easy. Some vendors may have to adapt their PCI cards for the Mac to achieve optimum performance. This could translate to extra cost for customers, who, instead of being

able to swap PCI cards between their Mac and PC, might end up having to buy different versions. Some vendors have already committed to making PCI cards for the Mac, but many are taking a wait-and-see attitude. If you buy a PCI-only Mac, your add-in choices may be limited until more vendors commit. You may also face problems if you want to transfer any of your NuBus cards to a Mac that supports only PCI. Fortunately, some companies have foreseen this complication.

Second Wave has announced Xpanse, a NuBus expansion chassis that will attach to your new PCI machine to let you use your old cards. And I won't be surprised if some enterprising clone maker offers a computer with slots for both NuBus and PCI.

#### Milestone 4: OpenDoc

If you're tired of switching from program to program just to complete work that ends up in a single document, OpenDoc may be for you. Currently, to produce a typical report, you write up the text narrative in a word processor, switch to a spreadsheet to prepare your charts, then draw a diagram in a draw package, and finally copy and paste all these pieces into a page-layout program to produce the final document.

OpenDoc takes a "document-centric" approach, letting you focus on the project as a whole, rather than on its component parts. When you work on a given element, OpenDoc automatically provides the appropriate menus and tools. In addition to simplifying the project from a user's point of view, this approach permits developers to focus on fine-tuning tools for specific purposes, rather than loading up their applications with redundant features that are better supported elsewhere. The anticipated result will be lower-cost tools that collectively make more efficient use of system resources such as RAM and storage capacity. To work within this document-based scheme, you will still need to have the appropriate tools assembled on your system and be sure that they support OpenDoc. Many developers are enthusiastically revising their applications to work with OpenDoc, but as is typical with new technology, others are taking a more conservative approach. In any case, OpenDoc won't ship until early 1996. (See the feature story "OpenDoc and OLE 2.0," November 1994.)

#### Milestone 5: Converged Platform

It could be called the second coming of the clones, but for now it's technically referred to as the Common Hardware Reference Platform, or more simply, the converged platform. This specification—jointly developed by Apple, IBM, and Motorola—severs the previously indivisible bond between a given hardware design and its target operating system. In the converged-platform future, you will be able to buy a computer that can be easily configured to run under various operating systems, including the Mac OS, NetWare, OS/2, Solaris, AIX, and Windows NT. The first Macs released in this environment may require a Mac-specific

*continues*

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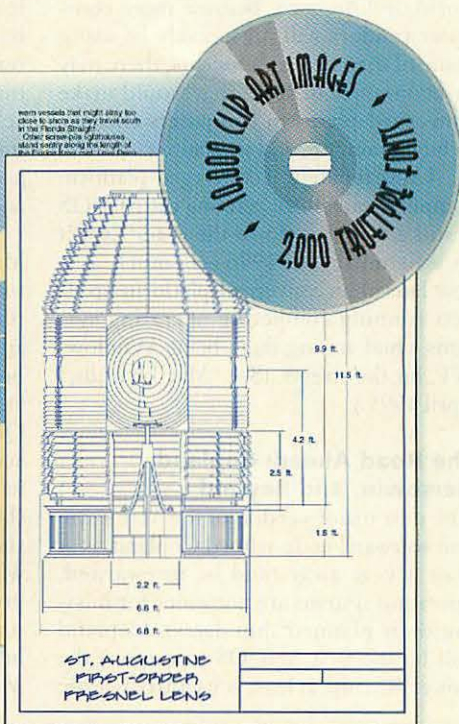
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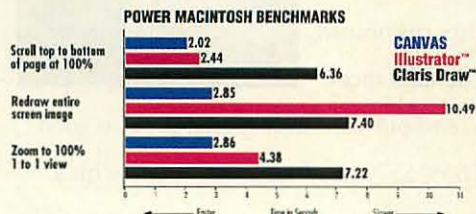


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ROM, but later versions will probably not need any special hardware.

The converged platform promises some enticing benefits. Users will be able to change their machine's identity simply by installing a different operating system. In complex workplaces the ability to easily support several platforms will make a world of difference. Because more computer vendors will presumably be using many of the same components, there may be economies of scale that would make converged-platform computers cheaper to buy, maintain, and upgrade.

Unfortunately, a converged-platform computer capable of running the Mac OS is still a far piece down the road. Expect to wait until late 1996—as much as a year later than converged-platform products running competing operating systems, chief among them being Windows NT, hit the streets. (See “Mac Hybrids,” April 1995.)

### The Road Ahead: Copland, Gershwin, and Beyond

The next major version of the Mac's system software, code-named Copland, is at least a year away (and be forewarned, operating systems are notorious for missing their planned ship dates). Copland will be the first Mac OS to require the PowerPC chip, at least at its introduction;

a 680X0-based version looks doubtful and would certainly be developed after the Power Mac version, if at all.

While you await Copland's arrival, it's interesting to note what Copland will do for you. Most significant to the user, Copland should run software faster, use resources more efficiently, and crash less often. You might also pass the time boning up on a cascade of technical terms related to the several architectural improvements that make Copland's achievements possible, such as *preemptive multitasking*, *multitasking*, *demand-paged memory*, and a *hardware abstraction layer*, or HAL.

Copland also noticeably enhances the Mac's interface, enabling you to customize many aspects of your work environment, such as menus, window frames, and views. An improved Apple Guide will help automate more operations for you, and system software components such as QuickDraw GX that you currently now acquire and install optionally will be built in, so more applications will support them. Although Copland's interface shows some of Apple's famed creative whimsy, the operating system's real promise rests not in its whizzy new features, but in the substantive value it will bring users in the daily operation of their Macs. (See the feature stories “The New

Mac OS Unveiled” and “The Mac's Jazzy New Face,” both in this issue.)

Beyond Copland lies a version of the Mac OS called Gershwin, about which it's too early to say much except that it will continue to extend the depth of memory protection and multitasking introduced in Copland for even greater functionality and stability.

### Beyond the Horizon

Even industry insiders and the most assiduous trend-watchers will tell you that to forecast the Macintosh's future much beyond a one- or two-year horizon is a dicey business. Not only does the technology develop far too rapidly to predict with confidence, but factor in the uncertainties of the business world, and all bets are off. What is clear is that Apple seems to be striving to achieve a more sensible balance between the dazzle of new technology and its pragmatic application. The synergy among these new technologies will lead to faster Macs capable of increasingly impressive graphics, as well as to cross-platform utility that may make it easier than ever to have and use a Mac in mixed environments. This new course that Apple is charting appears destined to benefit developers and users like us in tangible ways. And it's certain to be interesting. **m**

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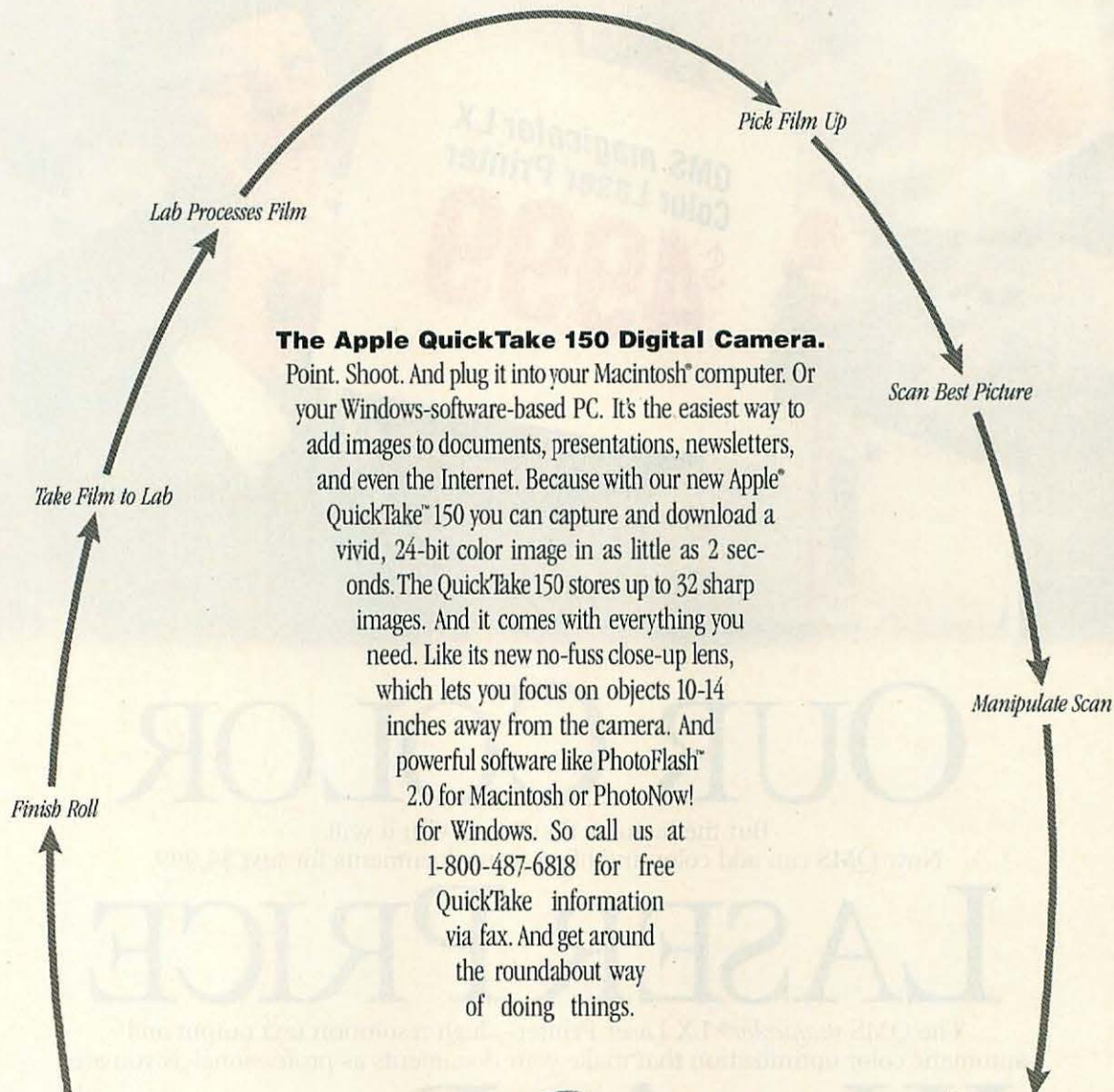


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# Letters

## What? No Freeware?

I WAS VERY DISAPPOINTED BY THE article "Meeting the E-Mail Challenge" in the April 1995 issue of *Macworld*. While the article does give some valuable tips on setting up mail servers, it fails to mention any shareware or freeware programs. Perhaps the most significant omission is Mailshare. This freeware program is the only true client-server mail system on the Mac platform. It is a port of the public-domain POP3 mail server and can be combined with Eudora 1.5.1 (also freeware) to create a very robust system, at no cost.

Bart Stidham  
Columbia, South Carolina

No slight to shareware alternatives was intended. We deliberately focused on products aimed at corporate users interested in building large, complex E-mail networks. Since business users typically want the support that comes with commercial products, we left shareware and freeware E-mail solutions for another time.—Ed.

## Questionable Loyalty

THE RECENT COLUMN BY ADRIAN Mello ("Cloning Opportunities," *State of the Mac*, April 1995) suggests that it will be difficult for clone makers to compete against Apple's "formidable customer loyalty." He then notes problems with Apple upgrades and take-it-or-leave-it systems. I suspect that Mac enthusiasts are loyal to the Mac Operating System and the wonderful software available—not to Apple.

Gary B. Weiss  
Webster, Texas

## Special Delivery 2.0

YOUR REVIEW OF SPECIAL DELIVERY 2.0 (April 1995) left us disappointed and confused. The review starts off with

a rather complete and accurate description of the product. The reviewer then talks about his students' experiencing occasional inconsistent behavior and system crashes, which he acknowledges he couldn't reproduce, and then says he found more glitches than he would expect in a version 2.0 product.

We were never contacted by either the students or the reviewer to find out why they were having problems, and if, in fact, the problems were attributable to Special Delivery.

We have thousands of satisfied users who have not experienced glitches or random crashes. In fact, Apple test engineers tested and approved the Special Delivery demo that shipped with the Quadra 630.

Peter Rosenthal  
Interactive Media  
Los Altos, California

## Overture, Schmoverture

IN A REVIEW OF OVERTURE (APRIL 1995), you refer to several competing music-notation programs but fail to mention the one I consider the best of all, Nightingale.

As a professional musician and composer, I find Nightingale has all the capability I need in a music-notation program. A complementary program, NoteScan, reads printed music with a scanner and converts it to a document editable in Nightingale. I hope you give attention to these programs in the near future.

Abram Plum  
Bloomington, Illinois

Readers can see for themselves by contacting Tap Music Systems at 206/462-1007 and asking for a demo copy of Nightingale (\$10), or by downloading it free from CompuServe (Go Midibren), America Online (keyword MMS), or sumex or umich Internet sites.—Ed.

## Microsoft Library 1.0

THANK YOU FOR PUBLISHING GUY Kawasaki's open letter to Bill Gates in the April 1995 issue of *Macworld* (*Wise Guy*). Bill Gates would be a national hero if he came to the rescue of our crumbling intellectual heritage, especially at the very time the National Endowment for the Humanities, which has done so much for the cause of preservation, is under attack.

The Council on Library Resources was formed in 1956 to assist libraries in finding cooperative solutions to their big problems: automation and preservation. Since then, the council has sponsored dozens of research and demonstration projects in libraries.

In 1986 a number of libraries and scholarly organizations banded together to concentrate on preservation. The Commission on Preservation and Access, for the last nine years, has been acting on behalf of the nation's libraries, archives, and universities to develop and encourage collaborative strategies for preserving and providing access to the accumulated record.

Both of these nonprofit organizations have small staffs who are leveraging a rel-

*continues*



## CORRECTIONS

■ MailHub from Control Data Systems does indeed support cc:Mail ("Meeting the E-Mail Challenge," April 1995).

■ Wolfram Research's Optica 1.0 is an add-on module for Mathematica, not a stand-alone application (Power Mac News, May 1995).

■ We incorrectly stated that Adobe Dimensions doesn't render in the background (Reviews, April 1995). Users may switch, via a Preferences option, to other programs while Dimensions renders in the background.

■ The correct phone and fax numbers for Mirror Technology (New Products, April 1995) are 612/830-1549, 800/654-5294; fax 612/633-3136.

■ The correct Web site for TidBits is <http://www.dartmouth.edu/pages/TidBITS/TidBITS.html> (Macworld Online, May 1995).

■ The PaperPort is a 200-dpi scanner, not 300-dpi as reported (Reviews, May 1995). Also, Visioneer offers E-mail links for Lotus cc:Mail, CE Software's QuickMail, Microsoft Mail, and Apple PowerTalk through a \$49 upgrade.

■ The author of Peter's Player 1.1 ("The Desktop Critic," April 1995) has moved. Peter Lee's current address is 3 Strippe Rd., Haydenville, MA 01039-9605. The shareware fee is still a disk and \$20.

■ The word processor included in ClinTrac 2.0 (Reviews, May 1995) is capable of multiple-page documents. Macworld regrets the error.

atively small amount of money to do the task Guy Kawasaki outlines. We welcome assistance from Mr. Gates and all others who agree that preservation of what society has thought and learned is important.

Deanna Marcum  
President, Council on  
Library Resources, and Commission  
on Preservation and Access  
Washington, D.C.

## Phaser Praiser

YOUR REVIEW IN THE APRIL 1995 issue of Macworld comparing Apple's Color StyleWriter 2400 with Tektronix's Phaser 140 printer does not stress the fact that the Mac to which the printer is connected is rendered basically useless while printing from a Color StyleWriter 2400. I feel Tektronix has done an outstanding job of bringing to market a low-cost, high-quality printer with an internal pro-

cessor. Your chart should also have noted the speed difference if the user does purchase the Ethernet upgrade as well as additional RAM. A comparison with the Color StyleWriter Pro on the graph would have been nice, too.

Andy Knasinski  
Glendale, Wisconsin

## Newton Natives Restless

STEVEN LEVY'S APRIL 1995 *THE ICONOCLAST* column, "The Palmtop Blues," contained a statement that will probably cause me not to send in my early renewal. The statement was "Now, Palm Computing, maker of a Newton program called Graffiti, asserts that its product will allow you to flawlessly input text into the device. But Graffiti requires you to alter the way you print, writing some letters in weird, neo-hieroglyphic fashion. In other words, change the way you write. Sorry. I have a near-religious belief that machines should adjust themselves to my behavior and not the other way around." When you started typing on a keyboard you changed the way you wrote to adjust to a machine. It took me about two days to become proficient using Graffiti. How long does it take a person to become proficient at typing?

I received my copy of Graffiti a few days before receiving the April issue of Macworld and can only describe your dismissal of this great program as the height of hubris. Graffiti is based on the concept that it will recognize any letter the instant you lift your pen. Believe it or not, it does so with nearly 100 percent accuracy. This requires that a few letters contain only a part of the letter since to complete the letter would take more than one stroke.

Graffiti changed my Newton from a toy to a computer. Apple should bundle it with the Newton until they can get it in ROM. It is that good. You owe it to your subscribers to have a complete review of Graffiti as soon as possible.

Arthur Price  
Tulsa, Oklahoma

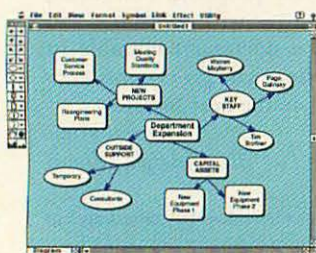
We're one step ahead of you, Arthur—we gave Graffiti a very respectable four-star review in our May 1995 issue.—Ed.

NORMALLY, I HAVE LEARNED TO ignore most of the (not always) good-natured ribbing about the Newton, but *The Iconoclast* is either an April Fools' prank to pull my chain, or Mr. Levy has his back turned to the PDA vertical market.

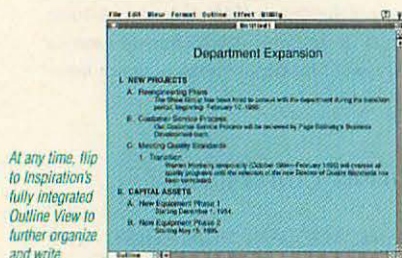
For the last eight months, I have used  
*continues*

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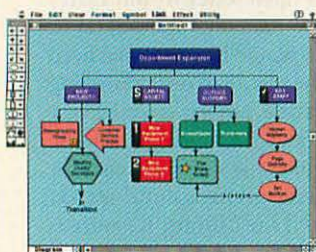
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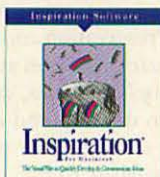
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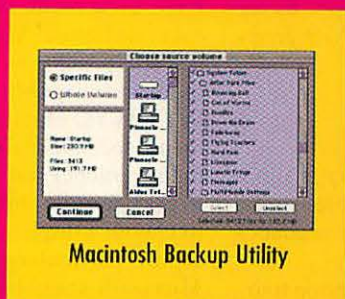
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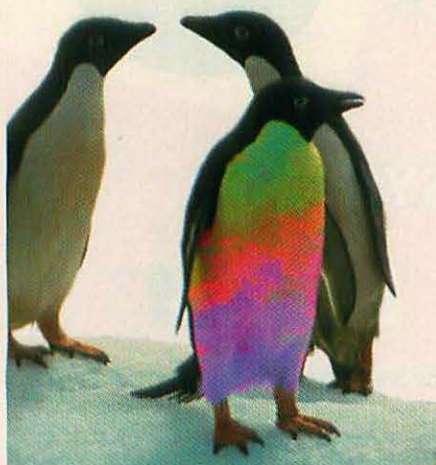
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a Newton as my primary E-mail and fax point of service, not because I have to, but because it is lightweight, small, and unobtrusive. I've had the pleasure of evaluating for the same purposes a Magic Link from Sony (on which this was written, with my PowerBook sitting asleep next to me) and find it equally fitting.

I wouldn't trade my PDA for the world. It has intimately changed how I work, not because I am a PDA software developer, but because it gives me what I used my laptop for in a small package I can use anywhere, anytime, with the same effort I use using a sheet of paper.

*Ray Rischpater  
AllPen Software  
Los Gatos, California*

## Working Even Smarter

**J**IM HEID'S APRIL 1995 *WORKING SMART* column on speeding up Macintosh performance was very informative, but there are a couple of things that should be mentioned about multimedia performance: (1) When you're running QuickTime 2.0, make sure you also install Multimedia Tuner (as indicated in the "Bugs & Turkeys" section of April's *News*), as this greatly improves movie playback performance; (2) QuickTime 2.0 can actually slow down some applications that were written for earlier versions of QuickTime. One example is Broderbund Software's game *Myst*, which runs fine with QuickTime 1.6 but is nearly unusable with QuickTime 2.0.

*Eric Bicker  
Barrington, New Jersey*

## Type Problems

**I** WOULD LIKE TO SOLICIT YOUR HELP with a situation that I believe can be adversely affecting my and my product's reputation.

There is a Star Trek convention touring the United States, and maybe worldwide, at which a regular vendor is selling a font package named Jackill's Future Fonts v1.0. I am told by people—at least the 30 that took the time—who have purchased this product that it is defective, if not a total rip-off! The packaging claims 50 fonts, but some users are reporting that they cannot access any fonts; those that can, encounter yet another problem—defective fonts. Both Mac and IBM users are affected.

My problem is that my name is the *only* name that appears anywhere in or on the packaging, due to the fact that they used my product, the *TypeBook*, in their

package in some way. Consequently, I am receiving all of what should be complaints directed to them. If I knew who they were I would attempt to contact them myself; however, I do not, and neither do any of their customers.

I have already made public posts on CIS and AOL, but the message has only a limited reach.

*Jim Lewis  
via America Online*

## But Will the NEA Approve?

**I** ENJOYED READING THE *MACWORLD* Online column's pick of art sites on the Internet in the April 1995 issue. Another site your readers might enjoy is the Medical Illustrators' home page, [http://siesta.packet.net/med\\_illustrator/Welcome.htm](http://siesta.packet.net/med_illustrator/Welcome.htm).

*Cecil Greek  
via the Internet*

Wahoo—illustrations of pancreatic cancers! Just be careful if you decide to visit this site before lunch.  
—Macworld Online

## Taken to Task over Works

**Y**OUR REPLY TO A LETTER THAT APPEARED in the April 1995 issue from a disgruntled Microsoft Works 4.0 user complaining about "permanent page mode" was unfair to him and to ClarisWorks and its users. Your claim that ClarisWorks "displays documents in page view only" is not true. ClarisWorks has a Page View menu item to allow control over this feature. And when in Page View, it is still possible to fine-tune the display to suppress page breaks or margin display. WYSIWYG should not be used as an excuse for inflexibility or foisting elegant inconvenience on consumers. ClarisWorks gives flexibility, allowing its users to choose a display mode that suits them at any particular stage of their work. Microsoft should be chastised for this human interface error.

*David Crowe  
via CompuServe*

Letters should be sent to *Letters, Macworld*, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), eWorld (Macworld), AppleLink (Macworld1), or via the Internet ([letters@macworld.com](mailto:letters@macworld.com)). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*. ■



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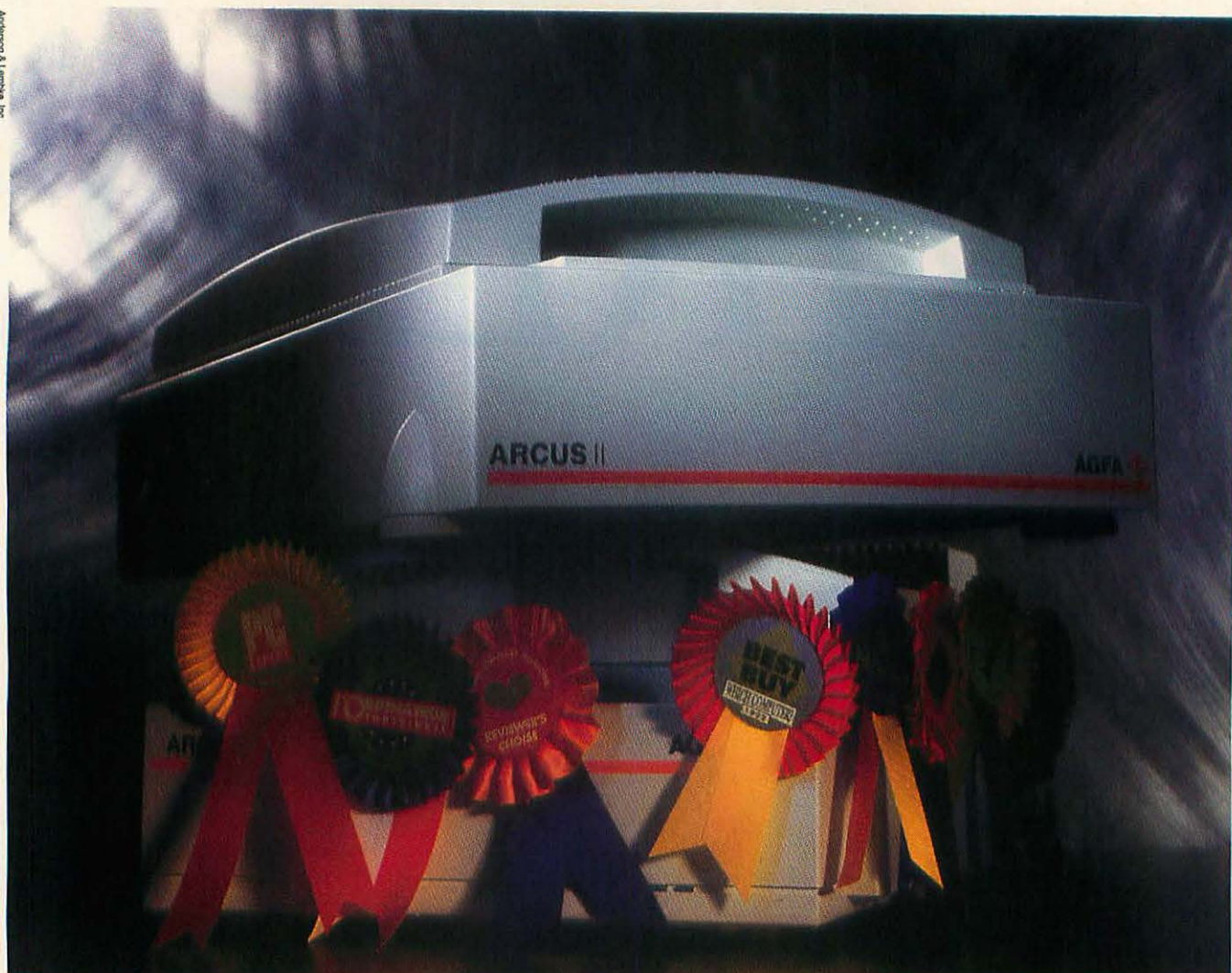
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# MacBulletin

## 🔴 Apple Unveils Power Mac 6200

**Series** Apple Europe recently began shipping the Power Macintosh 6200/75 and the Performa 6200CD, both of which have a 630-series-type system box and run on a 75MHz PowerPC 603 processor. If Apple follows its typical pattern, it is likely to introduce a U.S. version of the 6200 later this year.

The 6200-series machines both include 8MB of RAM, expandable to a maximum capacity of 64MB. The RAM is in the form of an 8MB SIMM that occupies one of the system's two 72-pin SIMM slots. The processor has a 16K on-chip cache and connects to a 256K Level 2 cache, which it needs to achieve performance roughly equivalent to that of a 60MHz PowerPC 601 chip without external cache. The European configurations include a 500MB IDE hard drive and a CD-ROM drive.

Essentially a Power Macintosh 5200 motherboard in a modular 630 box, a 6200 can accommodate the same multimedia expansion options as a 5200 (Apple's latest LC machine) or 630, including the internal TV tuner. The 6200 also has an LC III-compatible PDS slot, a communications slot, and a video-input slot. Also like the 5200 and 630, the 6200 has an infrared remote sensor, sound controls, and a headphone jack, all on the front of the case. The built-in video supports monitors as large as 15 inches. The systems have two serial ports, one ADB port, a SCSI port, a mono sound-in port, and a stereo sound-out port. The Performa comes bundled with more applications. The Performa 6200CD will sell in Germany for about DM 3000 (\$2182.50), but Apple's prices are generally higher in other countries than in the United States.

An Apple representative recently confirmed that the systems were introduced in Europe on April 28, but when asked by *Macworld* about the planned date of

introduction in the United States, the representative said, "Apple does not comment on unannounced products. We haven't announced that system here in the U.S. . . . That product doesn't exist in the U.S. at this stage." The Apple representative also noted that Mac configurations can vary from country to country.

## 🔴 Apple Discontinues Power Mac Upgrades

Apple recently discontinued its existing Power Mac motherboard upgrades. To help meet demand for Power Mac upgrades, the company licensed its Power Macintosh Upgrade Card (an add-in card) to DayStar Digital. Apple will no longer sell that product in the United States, but will continue to support existing Power Mac Upgrade Cards. DayStar, 404/967-2077.

## Faster CD-ROM for Summer Macs

Apple has replaced its double-speed CD-ROM drive with a quad-speed model. The \$349 AppleCD 600e also comes in an internal version, one that Apple will ship this summer in Macs and Power Macs sold with internal CD-ROM drives. Apple Computer, 800/538-9696.

## SyQuest Introduces Zip Competitor

On the heels of Iomega's well-received Zip drive, SyQuest recently announced the EZ135 Drive, which stores 135MB on removable cartridges and should have a street price around \$200. SyQuest says the 13.5ms average access time and maximum 2.4MB-per-second sustained-data rate of its 135MB 3½-inch removable Winchester drive yields twice the performance of Iomega's Bernoulli-based Zip. Internal and external SCSI versions should ship in July. SyQuest, 510/226-4000.

## Justice against Microsoft

The U.S. Department of Justice filed suit to prevent the proposed \$2-billion merger of Microsoft with Intuit, the dominant maker of personal-finance software. The suit alleges that the merger will be anticompetitive. **m**



# News

EDITED BY TOM MORAN

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## System 7.5 Update Causes Conflicts

Apple's recently released System Update 1.0, which upgrades System 7.5 to 7.5.1, is causing conflicts with a long list of software and hardware (see *MacBulletin*, June 1995). Designed to fix bugs and improve system performance, the update also offers improved file sharing, lets users drag and drop items to the Launcher, handles low-memory situations better, and lets the keyboard power-on key double as a power-off key.

**Software Problems** The most common problems by far are crashes on shutdown. Two extensions have been identified as causing such crashes, both from Symantec. MacTools Pro's TrashBack (503/690-8090) is one of the culprits; versions 4.0 and 4.0.1 now have a free updater (to version 4.0.2), which resolves the conflict. The updater is posted on Symantec's BBS and all online services.

The other problem extension is Norton Partition 2.0. Formerly part of Norton Utilities (503/334-6054), Partition was discontinued as of NUM 3.0 and will not be patched. Symantec recommends that you back up partitions and delete them, then switch to

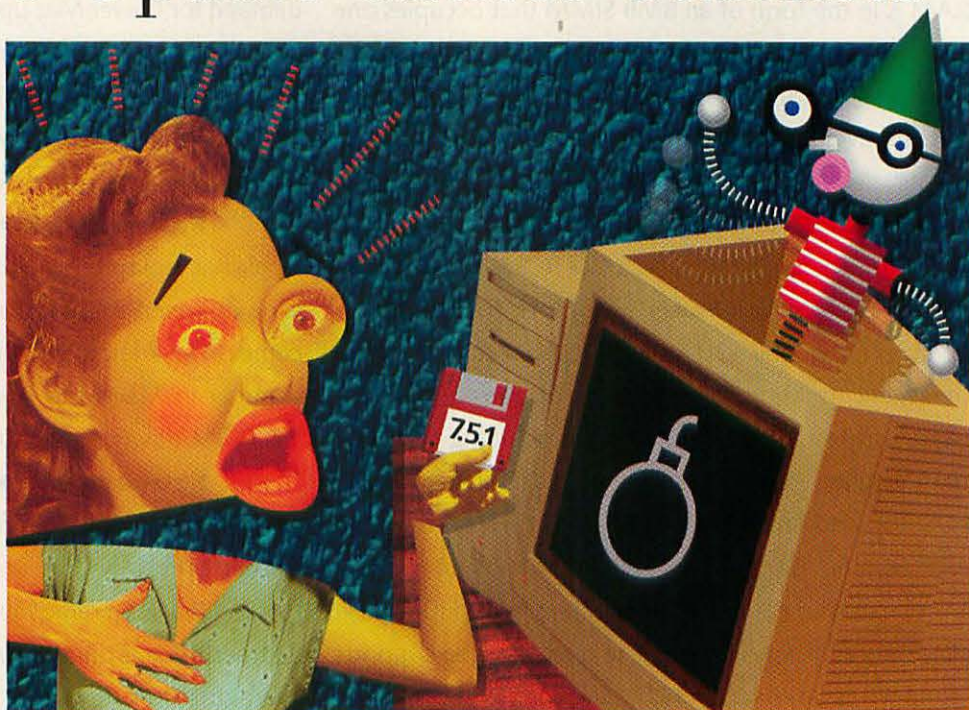
another product, such as a hard disk-formatting utility or file-security utility.

If you suffer from crashes and have neither TrashBack nor Norton Partition installed, your problem is probably an old and incompatible SCSI driver on one or more of your hard drives. Updating with a current, System 7.5-compatible driver utility (such as FWB's Hard

Disk ToolKit, Casa Blanca's Drive7, or CharisMac's Anubis) should solve the problem. You should update the SCSI driver before running the system updater, and preferably before installing System 7.5.

If Aladdin Systems' StuffIt SpaceSaver 3.5 loads after the new General Controls, files will become invisible. No data is lost, but the files are inaccessible from the Finder. At

press time, Aladdin (408/761-6200) had yet to determine the cause of the problem. Meanwhile, the workaround is either to use an extension manager, such as Conflict Catcher 3 from Casady & Greene (408/484-9228) or Now Startup Manager (part of Now Utilities 5) from Now Software (503/274-2800), or to get SpaceSaver to load before General Controls by



GORDON STUDER



renaming one of the two files.

Also, if you unmount a shared removable volume in System 7.5.1 with SpaceSaver loaded, it will lock up the Mac. This is due to a design change Apple implemented in File Sharing, and thus may affect other products besides SpaceSaver. It is still unclear who will provide the fix, or when.

SpeedyFinder 1.5.9i, the latest version of the versatile shareware control panel, will not load under System 7.5.1 because it does not recognize the new Finder. Unregistered copies expired on March 15, and users have been urged to upgrade to the commercial package encompassing SpeedyFinder7's features: Aladdin Desktop Tools 1.0.

Under 7.5.1 with File Sharing enabled and Connectix's RAM Doubler 1.5.1 installed, files on CD-ROMs may "disappear." Data is not affected, but access to it is. Connectix (415/571-5100) says the problem also occurs with System 7.5, and that RAM Doubler version 1.5.2 will fix it and other bugs. That version should be shipping by the time you read this.

Metrowerks' CodeWarrior PowerPC debugger, MW Debug/PPC, did not work with 7.5.1: Metrowerks (514/747-5999) has released an updater to the Net and to online services.

The E-Machines 3.5.5 control panel for E-Machines' graphics cards and Futura II/DSP cards will cause a crash when a Macintosh boots with the update installed. As E-Machines was absorbed by SuperMac before SuperMac was in turn merged with Radius, an update is unlikely. Radius (408/541-6100) does offer an upgrade path for E-Machines owners, however.

Apple's Find File 1.1.1 (408/996-1010) now works with Apple's foreign-language script systems (under WorldScript II). However, users of those systems with 2-byte characters, such as the Japanese, Chinese, and Korean Language Kits, had drastic

*continues on page 37*

## Power Computing Clones Arrive

USERS GET CHOICE OF SYSTEM CONFIGURATION



Power Computing, the first company to get an Apple license to produce Power Mac clones, shipped its first Macs in limited quantities on May 1, with volume shipments expected on June 1. The company hopes to compete with Apple's Power Macs by offering equivalent systems with a wider range of configurations, lower prices, and better technical support. The first Power Computing Macs will be PowerPC 601-based desktop systems comparable to Apple's Power Mac 7100 and available in three speeds: 80MHz, 100MHz, and 110MHz. A tower system comparable to Apple's Power Mac 8100 should begin shipping in June, as should the 80MHz desktop model.

All three of Power Computing's Power systems—the Power 80, Power 100, and Power 110—will come with the same ports as Apple's Power Macs, including SCSI, ADB, serial, and Ethernet. Also included are three NuBus slots, a front-mounted speaker (which the company claims offers better sound fidelity than Apple's), a 256K cache card, an extended keyboard (an extra purchase for an Apple Mac) and mouse, as well as System 7.5.1, 300 PostScript Type 1 and TrueType fonts, and a special edition of IDG Books Worldwide's *System 7.5 for Dummies*. You also get software: the current versions of Intuit's Quicken;

ClarisWorks; and Now Software's Now Utilities, Now Contact, and Now Up-to-Date.

The standard, accelerated video card will have 2MB of video RAM to support millions of colors on a 17-inch monitor; the VRAM can go to 4MB to support millions of colors on a 21-inch monitor. A first for the Mac market, the video card includes dual video connectors (one standard Mac DB-15 and one standard VGA), so you can use PC-style monitors without buying an extra adapter. To use a PC-style monitor in a Power Comput-



The Power 100 includes a 100MHz PowerPC 601 processor.

ing Mac without the card, you need an adapter.

Power Computing will sell direct, so customers can get the systems configured as they prefer. Customers will have a choice of hard drive capacity, ranging from 365MB to 9GB; installed RAM capacity, ranging from 8MB to 200MB; and monitor size, ranging from 14 inches to 17 inches. Other options include a quad-speed CD-ROM drive and an AV video card instead of the standard video card.

In the future, Power Computing expects to offer DOS cards, removable-media drives (such as SyQuest and perhaps Zip), and possibly systems that support both NuBus and PCI buses. Planned for summer or fall release are PCI-based Power Macs (*continues*)

### Updated File Translation

The newest version of the MacLinkPlus file-translation program includes a utility called FileView that lets you view files created by programs you don't have. MacLinkPlus also contains updated translation filters to handle the latest versions of Microsoft Word, Excel, and Works for Mac and Windows, and WordPerfect, WriteNow, and ClarisWorks for Mac. The Easy Open Translators version costs \$109; it contains Macintosh Easy Open, FileView, and all translators. The \$149 Translators Pro version adds Macintosh PC Exchange DOS-mounting software, while the \$199 PC Connect adds PC Exchange and a cable to directly connect PCs and Macs. 203/268-0030.

### Apple Tech Support Goes Online

Apple Computer has added an online tech-support area for its products to the company's eWorld online service. Users in the United States can post questions in the Ask Apple, USA forum (inside the Apple Customer Center in the eWorld Computer Center) and should receive answers from Apple's tech-support staff within one business day. There are no extra charges beyond the normal connection fees.

### 2 Million Strong

America Online recently welcomed its 2 millionth member, surpassing CompuServe and Prodigy to become the United States' largest online service. 800/827-6364.

### Modem Merger Final

The stockholders of U.S. Robotics and Megahertz Holding gave final approval to the merger of the two companies. Now called U.S. Robotics Access and Megahertz Holding, both are now wholly-owned subsidiaries of U.S. Robotics. 708/982-5010.



cluding models that use the faster PowerPC 604 CPU) and a low-profile model similar to Apple's Power Mac 6100.

Power Computing expects its systems' prices to be 10 to 15 percent less than equivalently configured Apple Power Macs. The company expects a Power 80, for example, to start at \$2000, while a Power 100 would start at \$2900.

One key difference Power Computing plans to offer customers is service. *Macworld* has found that Apple's customer support is habitually poor when it comes to new products, since representatives are usually not trained quickly enough to answer questions and solve problems. Power Computing hopes to be more active; it plans to call customers the day their systems arrive to ensure that everything was shipped and to follow up within two days to ensure that everything is working. Power Computing will offer toll-free technical support, and its goal is to connect callers to a representative within 3 minutes. The company will also offer a 30-day money-back guarantee.

*Macworld's* tests of prototype Power Computing Macs found them highly compatible and as fast as Apple's Power Macs (see "First Clones," *Macworld*, April 1995). Power Computing, 512/258-1350.

—GALEN GRUMAN

## From SIMMs to DIMMs

NEW TYPE OF RAM  
ON THE HORIZON

In its next generation of Power Macs, due this summer, Apple is planning to use a new type of memory card called a DIMM (Dual In-line Memory Module), which promises much higher RAM capacity, considerably faster performance, and potentially greater security for personal computers. The DIMMs have 168 pins in two (dual) rows of contacts (one row on each side of the card). The older SIMM (Single In-line Memory Module) cards have 72 or 30 contacts that are the same on both sides.

With the additional pins, a computer can retrieve information from DIMMs 64 bits at a time instead of the 32- or 16-bit transfers usual with SIMMs. Although you will be able to add DIMMs to the coming Power Macs one by one, if you install DIMMs in pairs they can support interleaved memory, so the computer can retrieve 128 bits at a time for even faster operation. (Some early Quadras had this capability with their SIMMs, resulting in a speed boost of about 5 percent.)

DIMMs will be available in 4MB, 8MB, 16MB, 32MB,

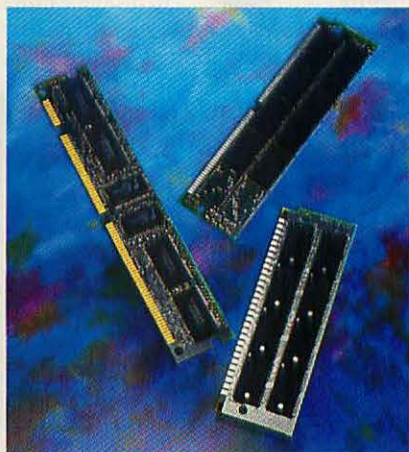
64MB, and 128MB sizes, so a future computer with eight DIMM sockets could conceivably handle 1GB (1024MB) of RAM. That huge amount of memory could change the way users work—for instance, possibly letting them create very large RAM disks for a high-performance computer.

DIMM memory speeds will probably stay at 60 nanoseconds (ns) for some time, at least for mass-production computers. Faster mem-

demand late this year as Windows 95 ships, since several PC makers will be adopting DIMMs as well, and Windows 95 systems will likely require 16MB or more.

Old SIMMs will not fit into DIMM sockets, although some companies may build socket adapters (so that people moving to personal computers with DIMM slots can use SIMMs from their old machines, reducing the overall initial cost of upgrading to the

new system). Adapters would have to cope with three problems. The memory-addressing circuitry in the adapter will slow down memory access slightly, the additional layer of contacts could reduce reliability, and mechanical fit will be a challenge in the tight space inside some computers. A few companies will remove RAM chips from old SIMMs and install them on a DIMM, but remanufactured cards will always have lower reliability than new cards.—CARY LU



The next generation of Power Macs will use DIMM strips similar to those shown above.

ory—40ns and 50ns—is expensive and hard to find, and a memory cache adds nearly the same speed advantage.

The Joint Electron Device Engineering Council (JEDEC) set the DIMM specification as an industry standard, so you will see the new memory card on many different kinds of computers. The spec allows for some extensions beyond simple memory, such as error checking and correction to improve reliability for critical computer applications and extended memory addressing to support encryption for secure communications.

DIMMs will initially cost slightly more than SIMMs on a per-megabyte basis, but the cost premium should vanish after a few months as DIMMs become common. Memory prices have been largely stable for the past five years, despite some hiccups, as demand continues to outstrip supply by a small margin. Some observers expect a sharp increase in

## Web Design Spins Up

COMING SOON TO  
A PROGRAM NEAR YOU

Designing your own World Wide Web page is getting easier. A host of products—add-ons to major applications, stand-alone programs, and shareware products—let you design documents in the Web's HTML (HyperText Markup Language) format.

HTML is a set of formats used to define document styles, layout, and hypertext links. Rather than requiring users to type HTML style tags, which is common in older HTML editors, the new

### THE AMCoEX INDEX OF USED MACINTOSH PRICES

Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
PowerBook 100/4MB/20MB	\$375	-\$25
PowerBook 140/4MB/40MB	\$625	-\$50
PowerBook 180/4MB/80MB	\$1400	-\$125
PowerBook Duo 230/4MB/80MB	\$725	-\$100
Mac Classic/2MB/40MB	\$275	-\$50
Mac SE/30/2MB/40MB	\$475	-\$50
Mac LC II/4MB/40MB	\$400	\$0
Mac IIsi/3MB/40MB	\$400	\$0
Mac IIfx/4MB/80MB	\$650	+\$25
Mac IIfx/4MB/80MB	\$700	\$0
Centris 650/8MB/230MB	\$1275	+\$50
Quadra 900/8MB/160MB	\$1850	-\$50

Index provided by the American Computer Exchange of Atlanta (800/786-0717). It reflects sales during week of April 20. Configurations include keyboard and exclude monitor and display board for noncompact models.



applications let users pick an HTML style—a particular kind of header, or a format for emphasis—and apply it to selected text.

Frame Technology has licensed a version of Quadralay's WebWorks, a translator that will be included in FrameMaker 5.0. Microsoft plans a Mac version of its Internet Assistant, a free add-on for Word that lets users create and browse Web pages. Quark is working on Orion, an XTension to QuarkXPress that can save documents in HTML format (see "Quark Extends Beyond Page Layout," *Graphics* news, May 1995).

Quarterdeck plans a Macintosh version of its WebAuthor plug-in for word processors; the company has not announced a release date. This summer, WordPerfect, Novell Applications Group, will release Internet Publisher, an add-on to WordPerfect with HTML capabilities similar to Microsoft's Internet Assistant for Word; WordPerfect's Internet Publisher Pro CD-ROM will also include TCP/IP connectivity.

Leading the stand-alone HTML editor pack is SoftQuad's HoTMetaL Pro, a \$195 editor now shipping. The product has strict HTML rules checking and includes templates, tables, style sheets, and an import feature.

Links to a variety of free and shareware HTML editors can be found at [http://www.yahoo.com/Computers/World\\_Wide\\_Web/HTML\\_Editors/Macintosh/](http://www.yahoo.com/Computers/World_Wide_Web/HTML_Editors/Macintosh/) on the Web. For more on the World Wide Web, see *At Work* news and *Networks* news in this issue.

Frame Technology, 408/975-6000; Microsoft, 206/883-8080; Quark, 303/894-8888; Quarterdeck, 310/392-9851; SoftQuad, 416/239-4801; Vermeer Technologies, 617/576-1700; WordPerfect, Novell Applications Group, 801/225-5000.

—JOANNA PEARLSTEIN

**"SYSTEM 7.5" continued**  
slowdowns during some find operations. Users with such script systems installed will be affected even if using a Roman



script at the time. Many are going back to Find File 1.0.

Apple confirms that there's a problem with Macs freezing on start-up when the new General Controls control panel loads. Some users have solved the problem by deleting the General Controls Prefs file; some, by rein-

stalling the update; others have gone back to General Controls 7.5.

Scott Berfield's shareware benchmark utility Speedometer 4.0.1 erroneously reports a slowdown in math performance on Power Macs with the update installed, according to many users.

**Hardware Problems** Sophisticated Circuits says its PowerKey devices (for turning on and shutting down the Mac) within the serial number range of approximately 33000 through 38000 may have a conflict with System 7.5 Update 1.0 on certain Macs. With these units, pressing the control, option, shift, or ⌘ key will bring up Apple's new Shut Down dialog. Sophisticated Circuits (206/485-7979) will replace the affected units free of charge. The company also offers a free control panel called Shut Down Control that fixes the problem. It is available from Sophisticated *continues*

## Even More Updates

APPLE OFFERS SEVERAL FIXES NOT IN SYSTEM 7.5.1

Several of Apple's recent updates have not been rolled into System 7.5 Update 1.0. Among these are Apple MultiMedia Tuner 2.0.1, PC Setup 1.0.3, Network Software Installer 1.5, and LaserWriter 8.2.2. PC Setup 1.0.3 ships with Apple's 6100/66 DOS Compatible system and Reply's DOS on Mac cards, but the System 7.5 Update installs PC Setup 1.0.2. You can safely run Network Software Installer 1.5 before or after installing the System 7.5 Update; the two do not affect any of the same files. The System 7.5 Update 1.0 installs LaserWriter 8.2: LaserWriter 8.2.2 (available from [ftp.support.apple.com](http://ftp.support.apple.com)) fixes a bug that prevents using printers in remote zones on multizone Ethernet networks.

Despite indications in the Read Me file to the contrary, 680X0 Macs use the ThreadsLib file that Easy Install places in most System Folders; this file fixes a bug in preemptive threads.

The 040 VM extension is rolled into the System 7.5 Update, while the Secret About Box from System 7.5 has been removed with the update. Also, for anyone whose Mac didn't lose its identity in the About This Macintosh window during the upgrade to System 7.5, the new update will get you. You can use Jonathan Jacobs' shareware application WhoAmI? 1.0 or Flux Software's freeware extension Mac Identifier 1.1.1 to reassert your Mac's individuality.—PETER M. STOLLER

### More Mac for Unix Systems

Apple has announced Macintosh Application Environment (MAE) version 2.0, which lets Sun and Hewlett-Packard workstations run Mac apps in an X Window with better networking support. Like the previous version, MAE 2.0 runs off-the-shelf Mac programs, but now it also supports AppleTalk so that technical Unix workstation users can share common resources. Apple also says that version 2.0 is more than 50 percent faster, has an improved NFS file system, and has players for QuickTime and HyperCard. 408/996-1010.

### Upgrading PowerBook 520's and 540's

Sonnet Technologies is shipping the PowerBook FPU Upgrade, a 68040 processor board that's the first method for adding a floating-point unit (FPU) to the PowerBook 520 and 540 series. The Sonnet upgrade includes a Motorola 33/66MHz 68040 processor with an on-chip FPU. It also increases the overall compatibility of the PowerBook 520 and 540 because some applications require an FPU. The board boosts the performance of a PowerBook 520 by 30 percent, making it the same speed as the PowerBook 540. The \$449 list price for the the PowerBook FPU Upgrade includes installation and requires the trade-in of the original processor board. 714/261-2800.

### 28.8-Kbps PC Card Fax Modem

Simple Technology announced the 28.8 Communicator, the first 28.8-Kbps PC Card (PCMCIA) fax modem that also includes voice capability and can connect through a cellular phone. The voice capability lets the 28.8 Communicator record phone calls like an answering machine. Expected to ship in May, the \$469 device fits in a Type II PCMCIA slot. 714/476-1180.



Circuits' online forums. On AOL or eWorld, use the keyword **sophcir**. On CompuServe, use **go sophcir**. On the Internet, it is available for anonymous FTP at **ftp.halcyon.com** in the directory **/local/sophcir**.

Power Macs using a CPU booster that happens to match the speed of another Power Mac model will prevent the update enabler from loading. If the boost is to some other speed, the enabler will load. Even with the update installed on disk, you will not see the new start-up graphic, and About This Macintosh will report your System version as 7.5. KS Labs (614/374-5665), Newer Technology (316/685-4904), and Output Enablers (no phone, reachable at **oe@io.com** or **http://www.io.com/user/oe/index.html**) have released free patches to online services and the Internet. Output Enablers claims its patch should work for CPU boosters from other makers.

The software for DayStar Digital's Turbo 601 PowerPC accelerator is not compatible with System 7.5.1. DayStar recommends that owners of the Turbo 601 not update to 7.5.1 until they have updated their Turbo 601 Control software to version 1.1, which DayStar posted online in April. Users who have already installed Apple's update should remove the System Update 1.0 file from the System Folder before installing the Turbo 601. With both the update and DayStar control panel installed, the Mac will bomb with an Unimplemented Trap error at start-up.

#### Installation Problems

Using the Easy Install option with extensions on can lead to all sorts of difficulties, from excessive disk swapping to corrupted installs. Always install software with extensions off. If you are installing from a CD-ROM, use Extensions Manager to disable all



extensions except those needed in the CD-ROM drive.

If the Launcher is set to show at start-up before you install, you will be still using the old version of the Launcher after you install the update. Why? The Installer moves the old Launcher to an Installer Temp folder inside your System Folder, to be deleted when the Mac reboots. However, the Startup Items folder will still have an alias pointing to the old version. This will cause the old Launcher to open at boot time early enough to prevent the Installer Temp folder from being deleted. To solve this, close Launcher, open the General Controls control panel and uncheck Show Launcher at System Startup. Then trash the Installer Temp folder and go back to General Controls and reenable Show Launcher at System Startup. Be sure to replace any other aliases of the old Launcher.

When the System 7.5 Update 1.0 Installer replaces your old MacTCP with version 2.0.6, the new information is saved into both the control panel itself and a MacTCP Prep file in your Preferences folder. If you have a Prep file, you lose nothing. If you don't, however, you lose all your settings. Many systems administrators distribute preconfigured versions of MacTCP to their users. Thus, these users have no MacTCP Prep files. To avoid wiping MacTCP settings, check to see if you have a MacTCP Prep file. If you don't, open

the MacTCP control panel, change the settings, close it, then reopen it and change them back. You will now have a MacTCP Prep file that will survive the update. System administrators can also distribute a MacTCP Prep file with their preferred setting prior to installing the Update.

If your copy of MacTCP is not named MacTCP—if it is named MacTCP 2.0.4, for example—the Installer will leave it untouched. To update MacTCP, you must then specify it in a Custom Install. If you have any Apple extensions or control panels that are either renamed or disabled by an extension manager, the Installer will not update them. The solution is to make sure all extensions have their orig-

inal names, then enable them with your extension manager and reboot (while holding down the shift key) before running the Installer.

Problems running a Net Install of the update from a Novell server could be a matter of timing. PCs round off file creation and modification times, so when you move Mac files onto a NetWare server, their time stamps are rounded. Unfortunately, Apple's Installer demands that files it is installing be precisely as specified in the Installer script. Thus, it will often fail when installing from a NetWare server. One possible solution is to set up a Mac server with System 7 file sharing exclusively for installing Apple System updates.—PETER M STOLLER

## BUGS & TURKEYS



Caere's OmniPage Direct 2.0 and OmniPage Pro 5.0 conflict with Adobe Type Manager 3.8.1 on Power Macs. At press time, Caere could not say when the problem would be fixed. Caere, 408/395-8319.



The Family Doctor CD-ROM, third edition, currently included in many Performa bundles, has a bug that garbles printed documents found with the Search command. Users can call the publisher and request a free update. Creative Multimedia, 503/241-4351.



RAM Doubler 1.5.1 on a Power Mac 6100/66 DOS Compatible will freeze your Mac if you save or transfer a file to the floppy drive. Connectix says a fix should be available the beginning of May. Users can download the patch from America Online or call Connectix, 415/571-5100.



inLarge, the Berkeley Systems software-magnification program for computer users with poor vision, crashes on any Power Mac. The company is working on a fix, which it says should be ready in a couple of months. Berkeley Systems, 510/540-5535.



You couldn't print from the HP LaserJet 4M's multipurpose tray from Word 6.0, so you upgraded to a LaserWriter 8.X driver (or Word 6.0.1). Now with the 8.X drivers installed, you have problems printing envelopes. Lucky you, Hewlett-Packard's tech support will fax you an instruction sheet on how to configure the Envelope Tool in Word 6.0. Hewlett-Packard, 208/323-2551.

Macworld will send you a Bug Report T-shirt if you are the first to inform us of a serious, reproducible bug that we report in this column, or a Turkey Shoot T-Shirt if we shoot your turkey in this space. See *How to Contact Macworld*.



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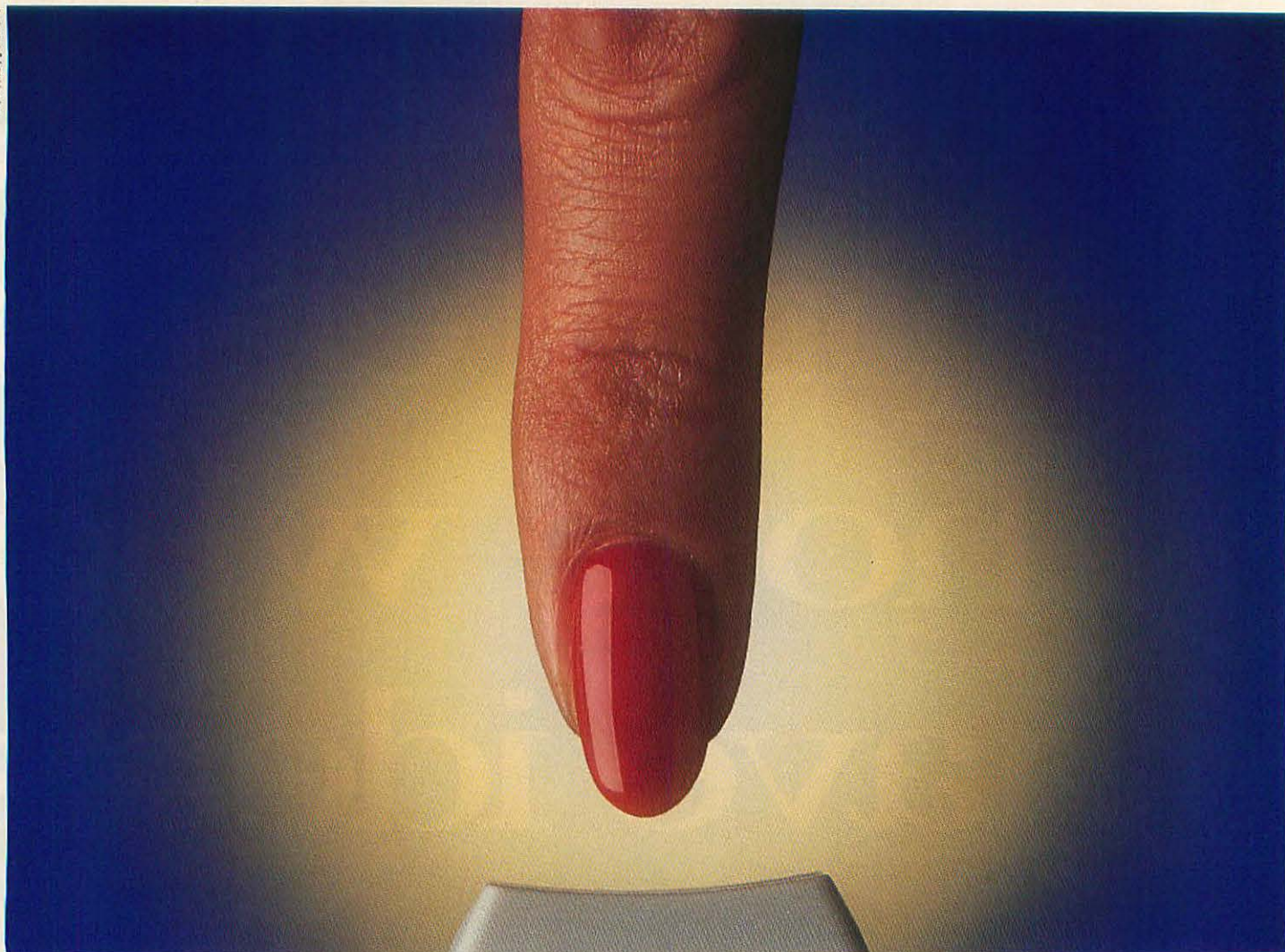
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# Power Mac News

## A Crucial Compiler Ships

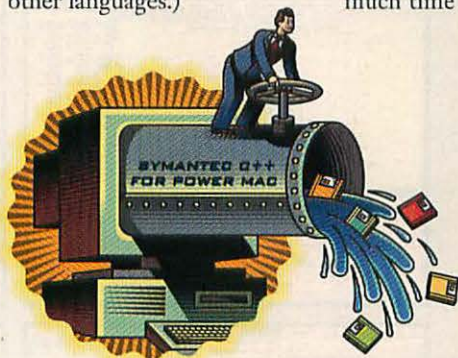
SCORES OF NATIVE PROGRAMS TO FOLLOW

Over a year ago, when Apple began seriously ramping up Power Mac production, developers using Symantec's wildly popular C compilers were faced with a hard choice. They could switch their development efforts into the new, unfamiliar, but nonetheless ready-right-now Metrowerks CodeWarrior environment, or they could gamble that Symantec, Apple's semiofficial favorite in the compiler race, would have a native Power Mac version ready in a few months.

Late in March the long-awaited Symantec C++ 8.0 for Power Macintosh (\$495, \$149 upgrade from other Symantec products; 408/253-9600) finally shipped. The results of Symantec's work are impressive: Symantec C++ 8.0 is loaded with features (including a great class browser, Visual Architect for interface design, a greatly improved editor, an interface for Language Systems' LS Pascal), and it produces fast, compact code. (Look for a review elsewhere in this issue.)

For Power Macintosh users, the arrival of this compiler means that there will soon be native Power Mac versions of many specialized vertical-market programs. Developers working with Symantec include Radius, Adobe Systems, Taligent, Nisus, Novell, SAS Institute, Aladdin, Digital Media, and several hundred others. In some cases these firms have already produced Power Mac versions of a few key programs using CodeWar-

rior and are now reevaluating development strategy across their whole product lines. Michael Hecht, developer at statistics giant SAS, says, "We want to see if we can use Symantec as a single source for Power Mac and Windows compilers, instead of using an assortment of tools from a half-dozen companies." Many developers report recompiling their CodeWarrior-based products with the new Symantec compiler, looking for speed and code size advantages. (Metrowerks said it will ship this summer a version of CodeWarrior that, like C++ 8.0, will have a class browser and hooks to other languages.)



Perhaps even more significant long-term is that the new compiler should make it easy to port existing Windows software to the Power Mac architecture. Early users of applications ported to Power Macs using the Symantec system report significant performance advantages compared with applications ported to Power Macs using Microsoft's current conversion system for Visual C++ code. That may mean a solution to Apple's biggest problem: the sheer number of Windows apps versus the number of Mac apps.

Smaller companies that produce Macintosh vertical-market software, and develop-

ers working in-house at large institutions (such as Sandia National Labs, Purdue University, and the National Research Council of Canada), have been longtime Symantec Think compiler fans and are now announcing simultaneous development of Power Mac and Windows software using Symantec tools. Symantec believes that several hundred commercial programs will be recompiled to native Power Mac versions in Symantec C++ 8.0 before the end of the year.

As one developer of image processing software explained, "I sell into a niche market, and I couldn't justify spending much time on code modification. I waited for Symantec so I could generate a Power Mac version without any extra coding effort. Also, Symantec has a clear path from the Mac to the Windows world, again with minimal effort. I'm a year late to

the Power Mac market, but I don't really have any competitors so it made sense to wait." For many other small developers of specialized software as well, the waiting is over.

Many industry observers agree that Metrowerks' development of CodeWarrior essentially saved Apple despite little or no encouragement from the company. The new Symantec system could have a similar but longer-term effect because of its potential for improving existing Power Mac applications, porting more 680X0 applications, and making Windows apps easier to move to the Power Mac.

—CHARLES SEITER

## PowerWatch

THE LATEST ON PRODUCTS FOR THE POWER MAC

Avid Technology's entire Media Composer line of modular video-editing products are now Power Mac native. The company is offering Power Mac compatibility through either board upgrades or complete system upgrades. Call for pricing. 508/640-6789.

- Bentley Systems has released MicroStation V5, a \$3950 CAD system. Owners of the 680X0 V5 version can upgrade for free; upgrade pricing for earlier versions varies. 610/458-5000.

- MathWorks has released MATLAB 4.2c mathematical software. It includes Notebook for Microsoft Word. Upgrade pricing for users of MATLAB 4.1 or 4.2 is \$95; pricing for MATLAB 4.2c starts at \$1695. 508/653-1415.

- Reply announced a DOS-compatible card for the Power Mac 7100/66 (but not the 7100/80). The \$695 PDS card should ship in June 1995. 408/942-4804.

- Spyglass is shipping Spyglass Plot 1.0, a \$295 data-analysis tool. 708/505-1010.

- Trinity Works is shipping the PowerPak clock-crystal accelerator, for all Power Macs except the 8100/110, for \$129; a PowerPak with an optional 256K cache is \$259. Trinity will offer trade-in credit on some of its single-speed clip-on accelerators.

As reported in *News* in this issue, Power Macs running System 7.5.1 won't start up if a clock-crystal accelerator is installed. Trinity says it has a free software fix. 800/278-4944.—SUZANNE COURTEAU



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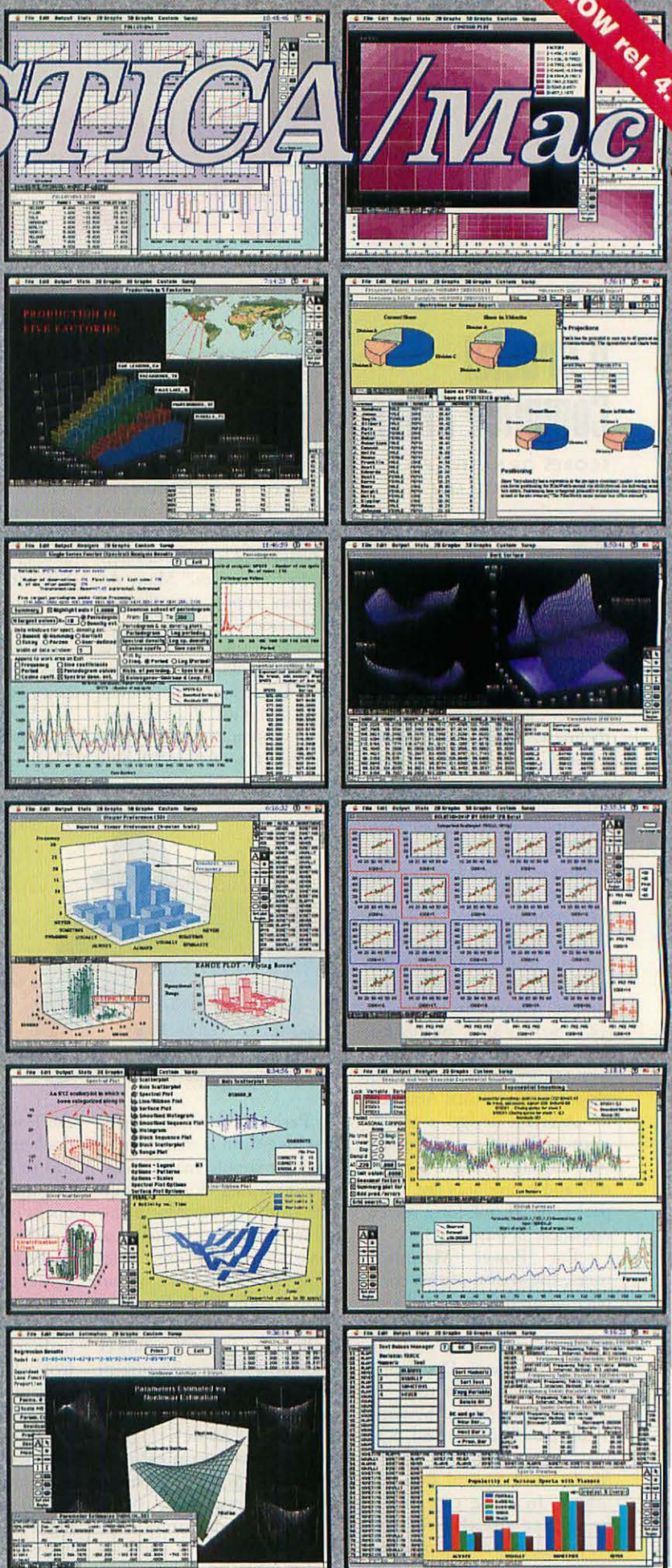
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# Macworld Online

by Macworld Online Staff

The Internet may hold rich troves for researchers and academics, but it would be a mistake to ignore the online fun quotient. Ever since the first Unix nerds and nerdettes began trading quips via IRC (Internet Relay Chat), the Net has bristled with humor, social commentary, and odd cultural effluvia. Whether logging on to commercial online services or cruising the Web, today's cybernauts are sure to encounter something to tickle their fancy.

## Web Fun

Proving that Web browsing can be more fun than a bushel of Net Bunnies, *Macworld Online* offers a spectrum of fun-filled sites. Many of us need our daily Dilbert fix, for instance. Pointing a browser at <http://www.unitedmedia.com/comics/dilbert/> yields the latest escapades of our eponymous hero, along with Dogbert, Wally, and the other cubicle dwellers in Scott Adams's acerbic comic strip about life in the information age.

The Internet Movie Database at <http://www.msstate.edu/Movies/> provides forms for searching films by title, personnel, genre, and other criteria; it also encourages you to add films, enter missing data, and offer your own review. It's egalitarian, eclectic, and very well organized.

Forget Letterman's Top Ten list. The propeller-headed monks that run The Keepers of Lists, a semihallowed Web site at <http://www.dtd.com/cgi-bin/topall>, create a compendium of lists that

changes daily. Meander at will; submit new items; vote for your favorites. Our national attempts at democracy should be so fun.

Dave Stanworth's Games Domain at <http://wcl-rs.bham.ac.uk/GamesDomain> is a one-stop cybermall for the digital derring-do set. Gamesters collect FAQs (that's frequently asked questions, in geek speak), tips, and alternative graphics for favorite computer games. The site offers a slew of downloadable demo and shareware game files, too.

The full text of many reference books is beginning to wend its way onto the Web. If you can't recall who intoned, "There is no great genius

without a tincture of madness," a quick trip to the Bartlett's Quotations site at <http://www.columbia.edu/~svl2/bartlett/> reveals the author as Seneca. Never be caught without a citation again.

Why wait for the evening news to see if your team won? Log on to ESPN at <http://ESPN.SportsZone.com> for the latest scores, schedules, statistics, and trivia.

If you're sick of the commercial suburbanization of the Web, check out Buzznet at <http://www.hooked.net:80/buzznet/>, a 'zine true to the anarchic, creative character of the Net. You'll find music and comic reviews, plus a column on fun antisocial behavior.

## Fun and Games

While you wait for summer's heat to descend, kick back with one of these cool downloadable games from our shareware libraries.

Pac-Man hath begotten a bevy of digital duck-and-dodge-'em offspring, but **Kevin Clancy's Super Pac-Man 2 v2.14** is the best of the lot, sporting sprightly sound and vivid color (147K; \$7).

If 3-D tank battles are your cup of TNT, **Randy Frank's Mac Bzone 1.3.1** should prove worthwhile. Just be sure to hone your reflexes and hand-eye coordination first (100K; free).

Kids should fall for Duan Blehm's **Stuntcopter 1.6**. Drop a man from a helicopter on high; if he lands on the hay-filled horse cart, hooray. If he doesn't, well, you can always try again (42K; free).

You don't have to buy a ticket to Las Vegas to gamble. **Glenn Seemann's Mac Video Poker 1.0.3** lets you pit your card-shark skills against your Mac's (217K; \$15).

**Exile 1.1's** hefty file size may seem excessive, but **Jeff Vogel's** adventure game offers commercial-quality graphics, cool puzzles to solve, and a slew of characters with whom to interact (1MB; \$25).

Don't forget, shareware exists because good Net citizens pay authors good tender for their efforts. **m**

## LIVE-EVENTS CALENDAR

Macworld Online continues to host real-time digital forums that feature the leading lights in the Macintosh community. We're bringing editors and writers, artists and visionaries directly to your desktop. Please come armed with questions, comments, and critiques. America Online events are on Thursdays, and eWorld events are on Wednesdays. All events are at 6 p.m. Pacific standard time.

### Star Trek VR June 1, AOL

Step on to the bridge of the *Enterprise*! Join the creators of the first QuickTime VR product, Star Trek: The Next Generation Interactive Technical Manual.

### Ask Cary Lu June 7, eWorld

In his monthly *PowerBook Notes* column, contributing editor Cary Lu covers mobile- and remote-computing issues. Online, Cary addresses a wide variety of computing topics.

### Deke McClelland June 8, AOL

If it's a graphics program, chances are good that graphics whiz and contributing editor Deke McClelland uses it. Meet the man who writes the book(s) on Photoshop, Illustrator, and FreeHand.

### The Illustrated Mac with Arne Hurty June 15, AOL

From drawings of carpal-tunnel syndrome to the anatomy of a Power Mac, *Macworld* informational artist Arne Hurty uses his considerable and varied talents to illustrate how things work. Come learn how he does it.

### Costa's Clinic June 21, eWorld

Join Macworld Online's own Steve Costa for a walk-in Mac clinic. Steve helps you tune up your computer, choose great shareware, and get the lowdown on all things Macintosh.

### Dilbert's Dad: Scott Adams June 22, AOL

If you don't make it to this event, be prepared to give up your place in Dogbert's New Ruling Class. Meet cartoonist Scott Adams, creator of the "Dilbert" comic strip and bane of middle managers everywhere.

### Jim Heid Q&A June 29, AOL

Contributing editor Jim Heid has a million Mac tips and tricks up his sleeve. He helps you get the most from your computer—be it a Performer or a Power Mac.

## REACHING MACWORLD ONLINE

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**Dennis Manarchy, F-8 at 1/64 sec.**

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
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# New Products

THE LATEST MACINTOSH RELEASES

by Jim Feeley  
and Joanna Pearlstein

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY MACWORLD. UNLESS OTHERWISE STATED, ALL PRICES ARE SUGGESTED RETAIL AND THE MINIMUM REQUIREMENTS FOR OPERATION ARE A MAC PLUS WITH 1MB OF RAM, RUNNING SYSTEM 6. A  SIGNIFIES THAT A NATIVE POWER MAC VERSION OF THE PRODUCT IS AVAILABLE. ALL INFORMATION AND PERFORMANCE CLAIMS ARE SUPPLIED BY THE PRODUCT VENDOR AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY MACWORLD. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

## HARDWARE

### 1724PD

This accelerated QuickDraw graphics board enables many entry-level Macs, including the Quadra 630 and 605 and several Performa models, to drive large monitors at resolutions up to 832 by 624 pixels with 24-bit color, and up to 1152 by 870 pixels with 8-bit color. The board fits into any Mac with an LC III/Quadra 630-type PDS slot and works with most multisynchronous monitors. \$499. Micro Conversions, 817/468-9922; fax 817/468-9932.

### 4-Sight Quatro

What do you do when you need to send 500MB of data across the country and overnight delivery isn't fast enough? The 4-Sight Quatro NuBus ISDN board can attain a data rate of 3.54MB per minute by transmitting files across as many as eight ISDN channels. The board can also simultaneously broadcast files to as many as four independent destinations. \$3495; with 4-Sight's ISDN Graphics Superhighway Broadcast software \$5795. 4-Sight, 515/221-3000, 800/243-0530; fax 800/448-3299.

### AlphaScan SV

The low-cost AlphaScan SV 14-inch monitor offers an active display area of 13.3 inches diagonal, maximum Macintosh resolution of 832 by 624 pixels, a 75Hz refresh rate, and a 0.28mm dot pitch. This Energy Star-compliant monitor includes manual controls for contrast,

brightness, and position and shape of the image. \$269. Sampo Technology, 404/449-6220; fax 404/447-1109.

### AppleCD 600e

Apple's quad-speed CD-ROM drive delivers a 684.4-Kbps streaming data-transfer rate and a 167.5ms average access time. The drive uses a caddyless tray loader, and can play both 3-inch and 5-inch CD-ROMs and audio discs. Starting this summer, an internal version will be included with many Macintosh computers. \$349 company's estimated price. Apple Computer, 408/996-1010, 800/538-9696; no fax.



dd.350 and xi.350

### dd.350 and xi.350

OK, so you've filled your hard drive with data for an almost-finished multimedia project, but you're already accumulating data for your next project. Now what? The hot-swappable xi stor system lets you easily switch hard drive mechanisms, so you can keep multiple drives available at the ready. The xi.350 Disk Container holds any 3.5-inch SCSI drive from 1.0 to 1.7 inches high. The dd.350 Desktop Dual Docking Station holds one or two disk containers. The company plans to integrate hard drives into its containers soon. xi.350 \$140; dd.350 \$360. xi stor, 702/824-7777; fax 702/825-3016.

### DLT20

Got more data than you can shake a DAT at? The APS DLT20 can pack 20GB of data on a \$45.95 DLT CompactTape III data cartridge at a transfer rate of up



DLT20

to 110MB per minute. That's 5 to 10 times as fast as DAT drives. The DLT20 ships with Dantz Development's Retro-spect 2.1 and both 50-to-50 and 25-to-50 SCSI cables. \$2999.95. APS Technologies, 816/483-6100, 800/235-2753; fax 816/483-3077.

### EAsycolor 24/1600

EA Research's newest graphics accelerator lets you splash your big monitor with all the colors in the 24-bit rainbow. The EAsycolor 24/1600 supports a maximum resolution of 1600 by 1200 pixels at a 75Hz refresh rate and comes with 8MB of VRAM. In addition to accelerating QuickDraw, the card also speeds up CMYK-to-RGB conversions and Photoshop filter performance. \$2499. EA Research, 510/867-0967, 800/681-6566; fax 510/867-0684.

### KeyStone

Macintosh users often complain that PC users have so many more ergonomic keyboards, mice, and joysticks to choose from. KeyStone lets Mac people hook up almost any PC AT-compatible input device, including Microsoft's popular Natural keyboard, to a Mac via the ADB port. The converter box doesn't disable existing ADB devices, and a control-panel device enables most PC keyboards to duplicate the functions of the Mac's special keys. \$99. Silicon Valley Bus Co., 408/623-2300, 800/775-0555; fax 408/623-4440.

### PowerPort Platinum and TelePort Platinum

If you've spent any time visiting the Web or an ARA server recently, you know the advantages a fast modem provides. Global Village's V.34 fax modems move data at 28.8 Kbps and faxes at 14.4 Kbps. The TelePort Platinum works with desktop Macs, while the PowerPort Platinum fits in all 100-series PowerBooks. Both modems include GlobalFax 2.5 software. TelePort Platinum \$279; PowerPort Platinum \$399. Global Village, 408/523-1000, 800/736-4821; fax 408/523-2407.

### Presenter 101

The Presenter 101 active matrix projection panel incorporates an 8.4-inch LCD with 640-by-480-pixel resolution and support for more than 185,000 colors. Weighing just 4.3 pounds, the portable panel uses a single cable to connect to either PC or Macintosh computers. The 3-by-4-inch control panel lets the user

adjust the image without projecting a distracting menu on top of the presentation. \$2795. nView, 804/873-1345, 800/736-8439; fax 804/873-2153.



RFS 3570

### RFS 3570

The Kodak RFS 3570, a 36-bit slide scanner, quickly digitizes color negatives and transparencies as large as 70mm at resolutions ranging from 800 to 2000 dpi. The speedy RFS 3570 scans a 35mm image at 2000 dpi in less than a minute. A 120-format image at 900 dpi takes less than two minutes. The scanner also features autofocus and automatic color-balancing. \$8995. Eastman Kodak, 714/726-7260, 800/235-6325; no fax.

### SyncMaster 15GLi and 17GLi

These monitors automatically find the optimum pixel resolution and refresh rate that your Mac or graphics card supports. The 15-inch and 17-inch SyncMasters offer on-screen adjustment of screen geometry, image size, pincushion, and color temperature. Both antiglare coated monitors offer a 0.28mm dot pitch and a maximum Macintosh pixel resolution of 1024 by 768 at a 76Hz refresh rate, and both comply with Ener-



SyncMaster 17GLi

gy Star and MPR II guidelines. 15GLi \$560; 17GLi \$849. Samsung Electronics America, 201/229-4000, 800/993-4110; fax 201/229-4069. continues



# SPEED

**If you spend your day creating** with Media-Publishing applications then you need the maximum in speed and productivity. If you make your living at graphic design, page layout, prepress, 3D, animation or multimedia, DayStar's PowerPC upgrades are just what you need to make your aging Mac brand new again. From early '030 Macs to Quadras, name your Mac and we'll speed it up.

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## TruePoint-DP15

If that Photoshop image of your grandkid is so cute that you want to reach out and pinch the tyke's cheek, then consider the TruePoint-DP15 Touch Monitor. MicroTouch's proprietary capacitive-touch technology responds to fingertip taps through up to two inches of glass. This 15-inch, 0.28mm dot-pitch monitor, aimed at kiosk, industrial, and multimedia markets, supports Mac pixel resolutions up to 1280 by 1024 at a 60Hz refresh rate. \$1445. MicroTouch, 580/659-9000, 800/642-7686; fax 508/659-9100.

## SOFTWARE

### 1995 Maui Golf Guide

Don't have the cash for a Hawaiian fantasy vacation? Relax, now you can tour 14 of Maui's golf courses—including Grand Waikapu, Kaanapali North,

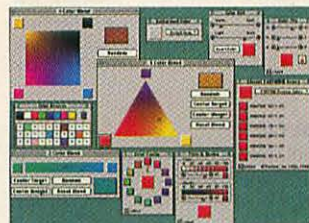


1995 Maui Golf Guide

Kaanapali South, Kapalua Bay, Kapalua Plantation, Kapalua Village, Maui Country Club, and Pukalani Golf Club—from your desk. The Golf Guide text and graphics describe every hole of each course, including rates, course designers, greens fees, and driving ranges. Requires 4.5MB of RAM, System 7, high-density floppy drive. \$29.95. Precision Guides, 503/227-6219, 800/580-5050; fax 503/227-4888.

### Color Compass

The days of trying to manually match your Adobe Illustrator colors to your Fractal Design Painter colors are over—at last. Praxisoft's Color Compass lets you create custom color palettes for use with Painter and Illustrator, Adobe Photoshop, and Macromedia's Director and FreeHand. When users create a custom color, Color Compass instantly displays all similar, complementary, and Pantone-equivalent colors. Requires 68020-based Mac with FPU, System 7. \$129. Praxisoft, 703/729-3391, 800/557-7294; fax 703/729-6875.



Color Compass

### Co-motion Lite for Internet

The Internet just got more useful: groupware for the Internet is here. Co-motion Lite lets users with direct connections to the Net brainstorm and collaborate in group sessions. Each participant's comments are contained in the live Session window. Users can create reports from

sessions. Statistical functions permit response analysis by averaging and calculating standard deviations for each idea. Requires 4MB of RAM, System 7, MacTCP, Internet connection. \$2000 custom license; \$78 for evaluation ten-pack. Bittco Solutions, 403/922-5514, 800/265-2726; fax 403/922-2853.

### FrameMaker 5.0

New features of FrameMaker 5.0 include automatic text runarounds, enhanced import filters, automatic column balancing, straddles, support for Adobe Type 1 fonts, and an export filter for HTML publishing (see "Web Design Spins Up," News, in this issue). Requires 68020 Mac, 5MB of RAM, System 7.0.1; System 7.1.2 required for Power Mac version. \$895. Frame Technology, 408/975-6000, 800/843-7263; fax 408/975-6600.

### Fuzzy Logic Toolbox 1.0

We've heard of gray-scale monitors, but gray-scale reasoning? Rather than limiting information to two states such as true/false, yes/no, or on/off, fuzzy logic accommodates relative attributes such as "louder," "faster," and "slippery." This MATLAB add-on toolbox lets engineers and researchers integrate the concepts of fuzzy logic into their systems. Still confused? Visit MathWorks' home page at <http://www.mathworks.com>. Requires Mac II, 8MB of RAM, MATLAB. \$895. MathWorks, 508/653-1415; fax 508/653-2997.



Kodak Build-It Software for the Macintosh

### Kodak Build-It Software for the Macintosh

Kodak's Photo CD authoring system, Build-It, puts your pictures on view anywhere there's a compatible CD-ROM drive. The product lets you convert TIFF, PICT, and Photoshop images to the Photo CD Image Pac format, and then store and distribute them via CD-ROM. The package includes color-management tools. For more information, visit Kodak's Web site at <http://www.kodak.com>. Requires 68040-based Mac, 64MB of RAM, Photo CD-compatible, double-speed CD-R drive, System 7; FVB Jackhammer SCSI card recommended. \$995. Eastman Kodak, 800/235-6325; no fax.

### KPT Vector Effects

Users of draw programs need no longer covet the effects their Photoshopping colleagues enjoy. KPT Vector Effects takes advantage of the plug-in architectures now available in Adobe Illustrator and Macromedia FreeHand to enhance drawings with effects including 3-D, distortion, bevel embossing, extrusion, perspective distortion, and stylization. Requires 68030 Mac with FPU, or Power Mac, 4MB of RAM, 8-bit color, Adobe continues



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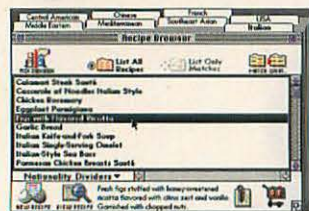
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## New Products

Illustrator or Macromedia FreeHand. \$199. HSC Software, 805/566-6200, 800/472-9025; fax 805/566-6385.



Mangia 1.2

### Mangia 1.2

Move aside, Julia Child, Jacques Pepin, and Craig Claiborne—make room for Mac. The latest version of Mangia, Upstill Software's kitchen companion, has enhanced speed, fonts, and print capabilities. Add-on cookbooks are also available, including *Tassajara Recipe Book*, *Good Cheap Food*, *Eat Smart for a Healthy Heart*, *One-Pot Meals*, *Fifteen Minute Meals*, *Elegant Low-Calorie Cooking*, and *Thirty-Minute Meals*. (Hey, cookbook publishers: how about *Cheap*, *Elegant*, *Low-Calorie*, *Healthy*, *One-Pot*, *15-Minute Meals*? Thanks.—Eds.) Recipes can be formatted to print as booklets or recipe cards. \$35 company's estimated price; add-on cookbooks \$10 to \$20 each. Upstill Software, 510/526-0178, 800/568-3696; fax 510/526-0179.

### Marketing Plan Pro

Marketing Plan Pro helps users create and manage marketing strategies. It walks the user through each critical step,

from analyzing the marketplace and choosing target markets, to making budgets and sales forecasts, to devising advertising, public relations, and direct-mail campaigns. After helping you create a complete marketing plan with text, tables, and charts, the product can assist in managing tasks, supervising follow-up, and tracking results. Marketing Plan Pro contains built-in spreadsheet, charting, and word processing software. Requires 6MB of RAM, System 7. \$149.95; Power Mac version \$179.90. Palo Alto Software, 503/683-6162, 800/229-7526; fax 503/683-6250.

### NetPhone

Ever dream of calling a friend in Calcutta from your home in Cleveland for the price of a local call? Electric Magic makes this dream come true. The company's NetPhone transfers audio over the Internet in real time. It records audio on one side, compresses it, sends it over the Internet, and decompresses it on the receiving end. The application notifies you when you have an incoming call. Demo versions are available from the company's World Wide Web site at <http://www.emagic.com/>. Requires Mac IIx, 4MB of RAM, System 7, MacTCP, Internet connection. \$75; two copies \$125. Electric Magic, 415/759-4100, 800/987-2001; fax 415/566-6615.

### PathWay Access, Macintosh 3.0

Wollongong Group's PathWay Access makes TCP/IP connectivity not only easier, but also more enticing. Version 3.0

includes applications for terminal emulation, E-mail, and file transfer, as well as a news reader, a script compiler, and a graphical keyboard remapper. The package also supports remote access via PPP. Requires Mac SE/30, 4MB of RAM, System 7. \$295. Wollongong Group, 415/962-7100, 800/872-8649; fax 415/969-5547.

### Smartsip and Smartsip Tracker

Wondering where that crucial document went? Used together, Smartsip and Smartsip Tracker constitute an electronic routing-slip system. Smartsip users can attach an electronic routing slip to documents sent via Microsoft Mail, CE Software's QuickMail, or Apple's PowerTalk mail systems. Smartsip Tracker helps find a document being circulated. Smartsip includes four types of routing slips—Review, Approval, Yes/No, and Sign-up—or you can design your own slips. Requires 4MB of RAM, System 7; Tracker requires Butler database. Smartsip five-user pack \$395; Smartsip and Smartsip Tracker five-user pack \$495 (does not include Butler database). ChorusSoft, 408/736-4024; fax 408/720-1949.

### SuperOffice 3.0

Get your entire enterprise organized—the client-server way. The powerful database in SuperOffice 3.0 lets you schedule appointments, record information about companies and accounts, track activities, and create reports. You can also link documents scanned by Visioneer's PaperPort personal scanner to records in the database. New in this

version are the user's ability to define database fields; multiple calendar views; event alarms; international address and phone formats; and built-in help. Requires 6MB of RAM, hard drive. \$219 for single-user pack. SuperOffice, 617/275-2140, 800/328-6868; fax 617/275-6921.

### TurboWriter and Shasta

Make your Mac multilingual. This word processor and dictionary, delivered on a CD-ROM, lets you communicate in five Asian languages—Japanese, traditional Chinese, simplified Chinese, Thai, and Tibetan. The word processor offers mail merge, multiple columns, in-line table creation and editing, vertical text, custom styles, page preview, a PageMaker file-import filter, and Claris XTND support. Shasta is a dictionary and word-by-word translation tool for English, Japanese, and traditional Chinese. A dictionary editor lets you create your own dictionaries. Requires CD-ROM drive, localized system software or language continues



TurboWriter and Shasta

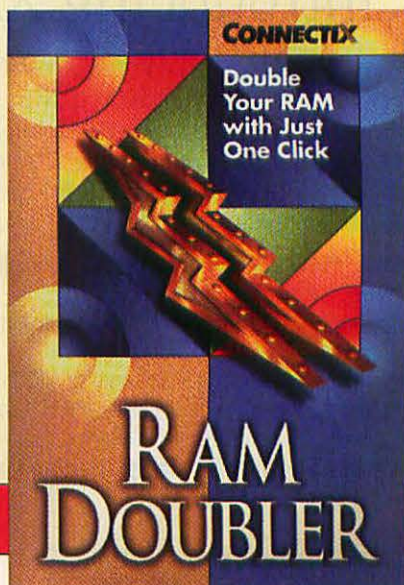
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## CONNECTIX

System Requirements: Macintosh equipped with a 68030, 68040 or PowerPC microprocessor. System 6.05 or later, including all versions of system 7 • 4 MBs required (hard disk required for machines with 4 to 6 MBs) • Not compatible with Mac SE, original Mac Classic, original Mac LC or PowerBook 100 or Mac II without a 68851 PMMU or any accelerator that does not work with virtual memory.



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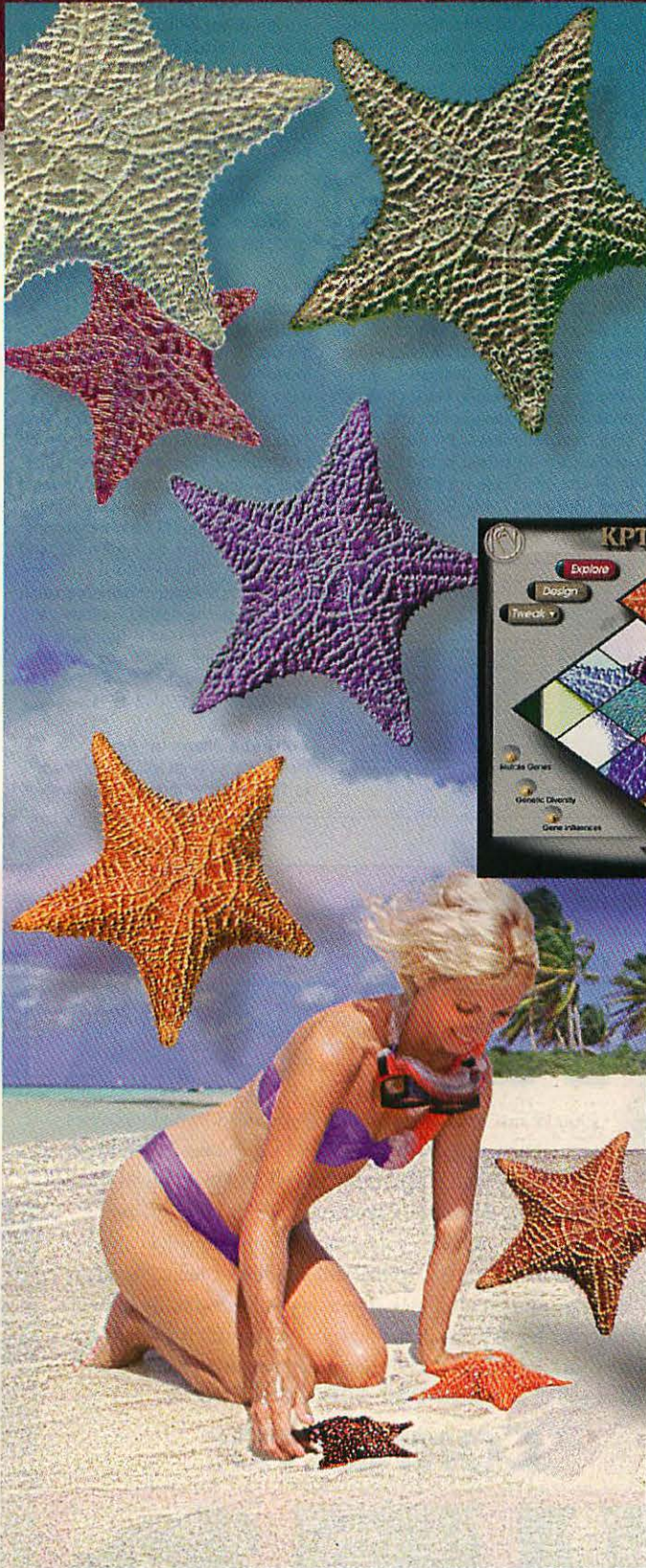
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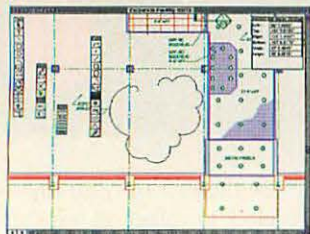
**MacWEEK**  
JANUARY 1995





## New Products

kit. \$295. Transpac, 408/261-7550, 800/745-0911; fax 408/984-6303; Japanese product sales 800/882-8856.



WildTools

### WildTools

WildTools is a high-end tool palette for Engineered Software's PowerDraw and PowerCADD. It includes powerful illustration, drafting, and dimensioning tools. Advanced tools let you measure from point to point, place a centerline at the midpoint of two lines, and automatically switch between fixed-offset and interactive operation. You can zoom in on and out of images and can adjust the method of drawing. Requires PowerDraw 5.0 or PowerCADD 1.0. \$189. Engineered Software, 910/299-4843, fax 910/852-2067.

### CD-ROMS

#### Haight-Ashbury in the Sixties

If you missed the sixties the first time around, don't be dismayed. Now you can be a virtual hippie with Compton's Haight-Ashbury in the Sixties. This

CD-ROM features music of the Grateful Dead and Jefferson Airplane, plus video clips from the first Human Be-In in San Francisco's Golden Gate Park and interviews with cultural icons Allen Ginsberg and Timothy Leary. Subtitled "San Francisco's Renaissance of Peace Love Consciousness & Community That Changed the World," the disc includes an adventure game that lets users explore Haight Street and different aspects of hippie youth culture. \$50 company's estimated price. Compton's NewMedia, 619/929-2500, 800/284-2045; fax 619/929-2600.

#### Her Heritage

This CD-ROM encyclopedia of famous American women contains information about more than 1000 American athletes, writers, artists, politicians, entertainers, and educators. Entries include photographs, drawings, film and video clips, and interviews. Profiles of the women are organized both alphabetically and by vocation. \$49.95. Pilgrim New Media, 617/491-7660; fax 617/491-6415.



Her Heritage

#### License To Drive

You don't have to give your teenager the keys to the Volvo to teach him or her how to drive anymore. Janus Interactive's driver-education CD presents drivers' manuals for all 50 states, plus sections titled Getting Your License, The Driver's Role, Vehicle Equipment, Rules of the Road, Signs & Signals, Driving Situations, Defensive Driving, Sharing the Road, Pedestrians, Alcohol & Driving, Traffic Infractions, and Accidents. Each section has a quiz at the end. \$89. Janus Interactive, 503/629-0587, 800/766-0835; fax 503/690-6690.

#### Macintosh Programmer's Toolbox Assistant and Inside Macintosh

Manna for Mac programmers! Users of Inside Macintosh can consult programming information from all 25 volumes of the *Inside Macintosh* library (over 16,000 pages), plus the digital version of *Macintosh Human Interface Guidelines*. Among hundreds of topics covered are file and memory management; imaging with QuickDraw; networking; SCSI, serial, and ADB devices; and QuickTime. The Macintosh Programmer's Toolbox Assistant has information about more than 5000 toolbox calls. Both CDs have search functions and hypertext linking. \$99.95 each. Addison-Wesley Publishing, 617/944-3700, 800/822-6339; fax 617/942-1621.

#### PC Globe Maps 'n' Facts

Planning a move to Mauritania or a trek to Tripoli? Better research your destination first using PC Globe Maps 'n' Facts.

In addition to more than 300 color and black-and-white maps and charts of the world, this CD-ROM contains information on political alliances, population, geography, economics, and national symbols for 227 countries. You can compare prices in other countries with a currency converter, look up visa requirements for various destinations, and find phone numbers for U.S. embassies around the world. \$32 company's estimated price. Brøderbund Software, 415/382-4700, 800/776-4724; fax 415/382-4419.

### ACCESSORIES

#### Companion Case

If you're tired of unpacking half your travel kit just so you can use your PowerBook, notepad, and papers at the same time, consider an alternative. By opening one zipper of the Portfolio Companion case, you can easily work with your computer, your papers, and a letter-size tablet. The leather case has pockets for disks, pens, business cards, and folders. \$129. Lighthouse Technologies, 619/452-8876, 800/443-3446; fax 619/483-1196.

#### Data-Vac Electric Duster

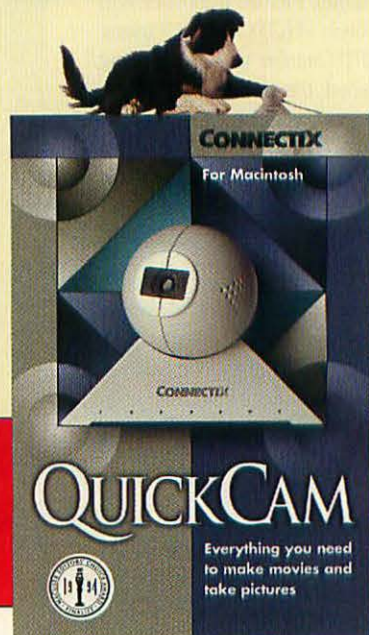
Eating sugar donuts at your workstation again? Well, Homer, the Electric Duster is designed to blow dust, lint, and debris off fax machines, printers, and other sensitive electronic equipment. The duster *continues*

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If you can *dream* it, you can *do* it.™



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## New Products

has a half-horsepower blower, a 12-foot power cord, and two nozzles. \$49.95. The Data-Vac division of Metropolitan Vacuum Cleaner, 914/357-1600, 800/822-1602; fax 914/357-1600.

### The Mouse Rest Wrist Support

If gripping your mouse hurts your wrist, ErgoView says it can help. The company claims that the Mouse Rest minimizes wrist strain by correctly positioning your wrist in a laterally and horizontally neutral position. Available for right and left hands, the cushioned Mouse Rest has a washable fabric cover. \$12.95. ErgoView Technologies, 212/867-0661, 800/888-3537; fax 212/867-2559.

### Neptune

No, *ulva rigida* isn't the condition tenors get when their voices seize up. Rather, it's an Italian sea plant harvested in the Venice Lagoon and included in Neptune, a smooth 80-pound text-weight paper (32-pound bond) aimed at the desktop and quick-print market. The company says converting seaweed into paper requires less energy than making paper from trees. Informal Macworld testing reveals that the paper neither smells nor tastes like a tide pool. The paper is available in five lightly speckled colors and several sizes. \$14.95 for a 100-sheet box of 8½-by-11-inch paper. Four Corners Paper Company, 602/991-2320, 800/775-2320; no fax.

### QV-10

How can you know if the picture you just took with your digital camera is any

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### Scream Computer Mouse Pad

Preserve decorum while expressing your despair with this mouse pad featuring a reproduction of Edvard Munch's painting *The Scream*. The 7¼-by-9½-inch pad has a durable plastic surface atop a natural rubber base. \$18. On The Wall Productions, 314/773-1939, 800/788-4044; fax 314/773-3446.

## BOOKS

### Photoshop 3 For Mac For Dummies

With humor and expertise, Macworld contributing editor Deke McClelland guides the graphically challenged through Photoshop's maze of features. McClelland covers retouching bad scans and out-of-focus pictures, preparing images for professional printing, and creating art with Photoshop. The book is aimed at beginning to intermediate users. 339 pages. \$19.99. IDG Books

Worldwide, 415/655-3000, 800/762-2974; fax 415/655-3299.

### The Power Mac Book

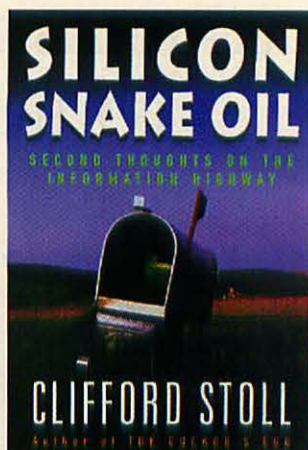
Ron Pronk tells readers how to get the most out of their Power Macs and Power Mac software. He discusses troubleshooting, running Windows software on a Power Mac, and the future of the Power Mac. The book includes a CD-ROM of shareware and demonstration software. 395 pages. \$34.95. Coriolis Group Books, 602/483-0192, 800/410-0192; fax 602/483-0193.

### Protect Your Privacy

PGP (Pretty Good Privacy), Phil Zimmerman's free encryption program, provides individuals with public-key cryptography similar to that used by governments and large corporations. William Stallings' *Protect Your Privacy* explains how to use PGP to keep your private messages private. This book guides you through basic concepts in cryptography and tells you how to use and manage PGP on various computer platforms, including the Macintosh. 300 pages. \$19.95. Prentice-Hall, 515/284-6751, 800/947-7700; fax 515/284-2607.

### Silicon Snake Oil

Clifford Stoll, one of the original Internauts, has some second thoughts on the information highway. His concerns aren't about increased government control over our lives. Rather, he worries that the Internet offers "plenty of human contact but no humanity." Although Stoll still frequents the Internet, he thinks



Silicon Snake Oil

that huge amounts of money and time are wasted in an attempt to keep up with technology and information that has little long-term value. 247 pages. \$22. Doubleday, 212/354-6500; fax 212/302-7985. **m**

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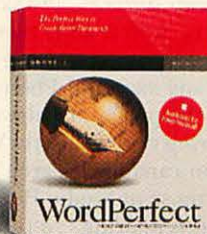
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# Reviews

## Vision 3d 4.0

### 3-D Modeler and Renderer

**PROS:** Excellent 3-D modeling tools; high-quality rendering capabilities; first-rate documentation. **CONS:** Only one level of Undo; truncated animation environment. **COMPANY:** Strata (801/628-5218). **LIST PRICE:** \$695.

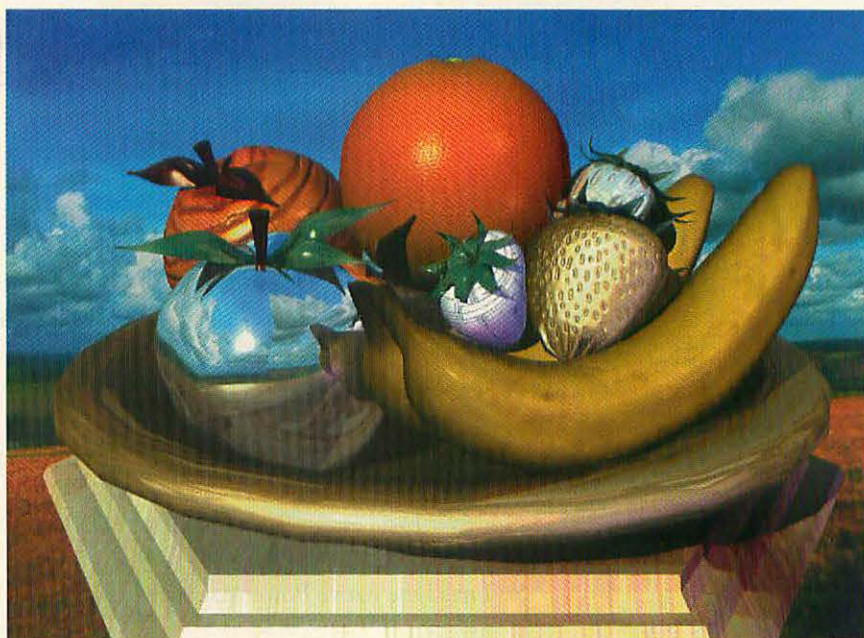


ALTHOUGH THROUGH THE years Strata's Vision 3d has been a highly regarded 3-D modeling, rendering, and animation package, recently it has been largely overshadowed by the company's Studio Pro. These days, Studio Pro is usually touted as the professional-strength tool, and Vision 3d is cast as an entry- to midlevel program. That's a bit of a shame, because Vision 3d is better now than at any time in its history. Over the past five years, Vision 3d has continually adapted and evolved, and the package you see today is a well-conceived, smartly executed, and modern-looking program with advanced modeling features and excellent rendering options.

With version 4.0, Vision 3d expands its array of modeling tools, adding the ability to perform Boolean functions, sweep surfaces, and skin and unskin objects. And it adds two new renderers—RenderScript, which lets you scale images to any size, and Phong with Shadows—to the program's already extensive rendering options. Sure, Vision 3d's animation capabilities aren't as sophisticated as those of Studio Pro, but for modeling and rendering, 3d offers a similar work environment and a comparable features list at half the price.

### Visionary Architecture

Vision 3d derives its modeling and rendering prowess from plug-in program



extensions. For developers, plug-ins are an easy way to add functionality; for users they provide a practical way to customize a program, letting you add or remove tools and features from the mix. Vision 3d's shape-creation tools, object editors, surface textures, and clip-object shapes are all extensions. Modeling plug-ins are either deployed on a button bar above the working area, found as menu selections, or both. Surface textures and shapes appear automatically in the Texture/Shapes palette.

In addition to a full complement of editable three-dimensional primitives (sphere, cylinder, cone, and so on), Vision 3d's modeling tools include the 2d Sculpter extension, which lets you precisely adjust Bézier-curved outlines that you can then lathe, extrude, and sweep into 3-D objects. In turn, you can reshape 3-D objects in the program's 3d Sculpter extension. The 3d Sculpter works with

both polygonal and Bézier objects, letting you edit them by manipulating individual vertices or by deforming surface patches, a technique similar to shaping soft-clay models.

Vision 3d's new Boolean modeling extension allows you to perform union, subtraction, and intersection operations on objects. Vision 3d is a surface modeler, so the program performs these functions by calculating the interaction of the object surfaces. For example, union melds one object with another and removes their intersecting surfaces, while subtraction produces a gouge on one object from the intersecting surfaces of the other.

To perform Boolean operations you first move the objects into intersecting positions in the three-dimensional scene and then activate the Boolean modeler—a dialog box with a pair of scrolling lists—where you must find and select the objects you want to modify. The Boolean dialog



box lists every object in the current scene, but when you select an object, a wireframe thumbnail appears so that you can make a more-positive identification. Choose a Boolean function, and click on OK, and the modified object appears in the 3-D space.

Boolean capability is a great addition to Vision 3d, but unfortunately, the implementation isn't the best. Scrolling through lists to find the correct objects is cumbersome, and it can be confusing when the 3-D space contains several items identically named "cylinder" or "sphere." It would be easier on the user if the objects selected in the 3-D scene appeared automatically in the Boolean modeler, as they do in the 3d Sculpter. Furthermore, an implementation similar to the 3d Sculpter's would allow you to move around the object, see the effects of the Boolean operation, and make necessary adjustments before returning the object to the 3-D scene. As it stands, if you need to alter object positioning, you must undo the Boolean immediately upon returning to the 3-D scene. If you change viewpoints to assess the object's geometry, you can no longer undo the Boolean—you must start over.

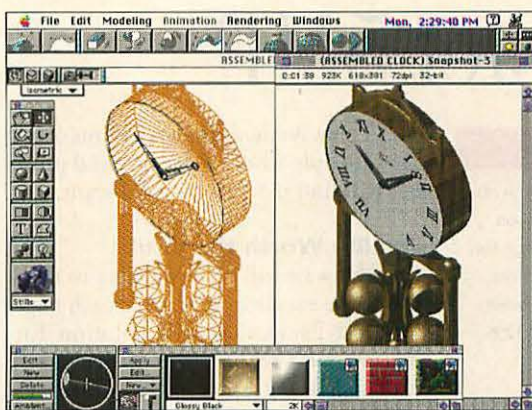
True, the majority of Vision 3d's modeling extensions behave similarly; the program overall could use a few more levels of Undo. But modelers such as Lathe, Extrude, Skin, and Sweep perform object-construction operations that are generally easier to judge at first glance. On the other hand, Booleans are often object-editing operations, which tend to require more fine-tuning. All that said, I should in fairness note that Vision 3d's Boolean functions, like all its modeling extensions, work just fine.

### Visionary Images

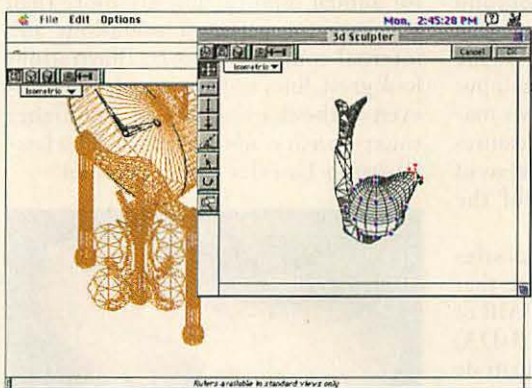
Even when it was not as competent a modeler as it is today, Vision 3d was always an excellent rendering program. In addition to such standard renderers as Gouraud, Phong, and ray tracing, Vision 3d offers three unusual imaging options—RayPainting, Phong with Shadows, and RenderScript.

The RayPainting feature works like ray tracing, but rather than producing photo-realistic images, it emulates natural-media effects such as dry-brush and watercolor. In addition, RayPainting comes with two preset choices that reproduce the painting techniques of Vincent van Gogh and Georges Seurat.

New to version 4.0 is Phong with Shadows, a separate renderer that offers all the capabilities of Vision's regular Phong engine and adds the ability to create shadows. Also new is RenderScript, a



**Practical Vision** Vision 3d presents a straightforward environment that is simple to learn and use. Modeling tools, surface textures, lighting, and object shapes are all within easy reach.



**Object Editing** The 3d Sculpter extension lets you edit object surfaces by pushing and pulling on their vertices.

Phong-based renderer that produces images in the EPS (encapsulated PostScript) file format. RenderScript can produce such photo-realistic effects as surface mapping and glowing surfaces, and since the output file is in PostScript, its images can be scaled to any size.

Vision 3d comes with dozens of surface and procedural textures to give objects the look of materials such as stone, wood, and glass. Surface textures are image maps applied to the outside of an object, while procedural textures are mathematical descriptions of texture materials that are applied to the entire object. Vision 3d provides excellent controls for customizing texture attributes, such as diffusion, specular, transparency, and bump mapping.

Sadly, the Goodies CD that used to ship with Vision 3d is gone. It was filled with additional sample textures and shapes you could use right away. Vision 3d now comes with a locked CD containing complete shape and texture libraries; to unlock the libraries, you call Strata and get the key over the phone (you will need a credit card). But whereas the samples in the Goodies disc whetted the appetite, the library CD suppresses

desire. Its browser provides such tiny thumbnails, you can barely see what you're buying.

Vision 3d 4.0 offers a competent, if somewhat limited, animation environment that lets you move objects along spline paths and animate textures to create surface transformations. In addition, the program comes with animation extensions that produce bouncing effects, convert 2-D lines to animation paths, and keep cameras pointing at moving objects.

In practice, the animation tools look and feel much like the ones in Studio Pro, but they lack the power, capacity, and flexibility of Vision 3d's high-end relative. Nowhere is that more evident than in Vision 3d's truncated animation palette, which is capable of holding only one object or group at a time. Although Vision 3d is more than adequate for creating simple motion effects such as flying logos, it is not equipped to tackle complex animations.

### Visionary Docs

For the most part, 3-D programs are complex constructions that demand time and effort to learn and master. Packed with tools and features, Vision 3d is no exception. However, the program's excellent documentation makes the learning process relatively painless. Don't be put off by the two hefty manuals—one for modeling, the other for rendering and animation. With tutorials interspersing fairly comprehensive reference material, these manuals are easy to read, informative, and generally well organized.

If you just can't wait to get going, a separate tutorial volume provides a brief but thorough introduction to all facets of the program. Vision 3d runs on both 680X0 and Power Macintoshes and requires a minimum of 8MB of RAM. (I recommend a Power Mac with as much RAM as you can afford.)

### The Last Word

With years of fine-tuning behind it, Strata's Vision 3d has matured into a wonderful modeling and rendering package. As long as your animation requirements are modest, Vision 3d is suitable for professional use in applications ranging from graphic arts to industrial design. —CARLOS DOMINGO MARTINEZ



# HP LaserJet 5MP

## Personal Printer

**PROS:** Excellent gray-scale printing; 600-dpi resolution; takes less than 15 minutes to install on both Macintosh and Windows; can print large files with the standard 3MB of RAM. **CONS:** Prints only 6 pages per minute. **COMPANY:** Hewlett-Packard (800/752-0900). **LIST PRICE:** \$1299.



FOR JUST \$1299, THE HEWLETT-PACKARD LaserJet 5MP laser printer meets the high demands of small businesses and home offices with robust features such as 600-dpi resolution, support for Adobe PostScript Level 2, and automatic-input switching between DOS/Windows machines and Macintosh networks—features that have become standard in this class of printer since the introduction of the Apple LaserWriter Select 360.

Additionally, the 5MP includes Adobe Memory Booster, software that makes better use of the printer's 3MB of available RAM, and an infrared (IrDA) port for the growing base of compatible portable and hand-held computers. Although the 5MP doesn't have built-in EtherTalk or built-in fax, both are available as options.

### Six Pages per Minute

The printer's major drawback is that it prints only 6 pages per minute—an improvement over the LaserJet 4MP's 4 ppm, but slow when compared with the Select 360's 10 ppm.

For most tasks in Macworld Lab's standard test suite, including business documents with a variety of fonts and formats, we found that printing on the 5MP took approximately 40 percent more time than on the Select 360. For instance, when printing a 20-page Courier document from Word 6.0.1 at 600 dpi, the Select 360 took 139 seconds, while the LaserJet 5MP took 221 seconds—a difference of 82 seconds. Still, except for serious procrastinators, the slower speed

doesn't always mean much in terms of lost time. People who use background printing will find the delay insignificant.

### Quality Worth the Wait

And the wait will give you time to think about the excellent quality of each page. Hewlett-Packard uses Resolution Enhancement Technology to provide crisp text and line graphics, even with light weights and very fine lines. The printer is capable of 120 shades of gray, providing close to newspaper-quality gray scales. While the photos I printed were not fit for annual reports, they are more than adequate for paper presentations and internal company reports. Illustrations look great: lines and tints stand out well—even without using one of the higher toner-density options that Hewlett-Packard's LaserJet Utility provides.



ROBERT PERRY

The 5MP performed admirably with large images as well. In just 3MB of RAM, I was able to send a 288-dpi, 7-by-10-inch Photoshop file to the 5MP without an error. The 5MP's PostScript SIMM includes Adobe's Memory Booster technology, letting the printer compress resources such as fonts in the available memory. The 5MP has two additional standard 72-pin, 32-bit SIMM slots that accept up to 16MB each (for a total of 35MB). With less than 7MB of memory, the LaserJet 5MP rasterizes a page in strips to conserve memory; above 7MB each page must fit into memory—a potential problem with extremely large and complex files.

### Setup with Ease

Installing the 5MP is incredibly easy. I was up and running on both a Power Mac 7100 and a Pentium 90 with Windows in under 15 minutes—total. Connections, both parallel and LocalTalk, are hidden by a plastic side panel. Like other Canon-based printers, the 5MP uses an all-in-one microfine toner cartridge that includes the photosensitive drum.

The 5MP includes Mac and Windows software, as well as QuickDraw GX drivers. A utility lets you manage fonts; print density; printer name and password; and EconoMode, which uses half as much toner per print. You can set resolution (300 or 600 dpi), Resolution Enhancement level, and printer-tray priority from the utility or the Print dialog box.

The LaserJet 5MP's two paper trays handle a variety of media and sizes. The first tray is a foldout multipurpose tray for letterhead, envelopes, labels, card stock, or transparencies. Paper sizes can range from 3 by 5 inches to legal size. A second paper tray, which slides under the printer as a drawer, holds up to 250 sheets of plain laser paper from standard letter size to A4 size to legal. A foldout output tray on the rear of the printer straightens the paper path so that paper doesn't curl. And there's a second output tray on top. When you print from the paper drawer to the top output tray, the paper path curls tightly around two rollers, which limits the range of paper you can use (16 pounds to 22 pounds).

I'd like to see future printers offer built-in PostScript fax and hard drive support for fonts. HP provides optional Ethernet and EtherTalk compatibility through its JetDirect EX printer server for \$399 and optional fax capabilities with its PrinterPal Group 3 fax for \$239.

### The Last Word

The LaserJet 5MP exceeds the quality and versatility that most home-office and small-business users actually need. Granted, the 5MP is not as fast as its chief competitor, the Select 360, but for nearly identical features the 5MP costs about \$200 less on the street. Price-sensitive people will be very happy with the LaserJet 5MP.—TIM WARNER



### How Fast Is the HP LaserJet 5MP?





# Zip Drive

## Storage

**PROS:** Near hard-drive speed; reliable performance; beautiful packaging; easy setup.  
**CONS:** Limited SCSI ID setup options; no on/off switch; not compatible with existing removable drives. **COMPANY:** Iomega (801/778-1000). **COMPANY'S ESTIMATED PRICE:** \$199.95; 100MB cartridge \$19.95.



**F**EW PRODUCT ANNOUNCEMENTS have generated as much anticipation from users as the one for the Iomega Zip drive. Imagine a 1-pound external drive, offering near hard-drive speeds, with a street price of about \$200. Now imagine that it uses floppy-disk-size media, with 100MB capacity, that cost less than \$20 per disk. (Both prices put this product at a much lower price per megabyte than a typical SyQuest drive.) It seems almost like a dream come true—and, with Iomega's new Zip drive, this is a dream that's largely realized.

The drive itself is dark blue, with an attractive, high-tech look. A plastic window at the top lets you see the cartridge inside, and there are decorative ridges toward the rear of the drive, on both top and bottom. You'll find nicely designed indentations in the right side for the power-supply cord, and at the front for easy cartridge insertion. Rubber feet on the bottom of the drive add stability in horizontal orientation; additional feet on the right-hand side allow for somewhat shaky vertical operation. The entire mechanism weighs about 1 pound and is 1½ inches high, a little over 5 inches wide, and a bit over 7 inches long. With the drive, Iomega supplies a 100MB cartridge called Zip Tools, containing all the bundled software.

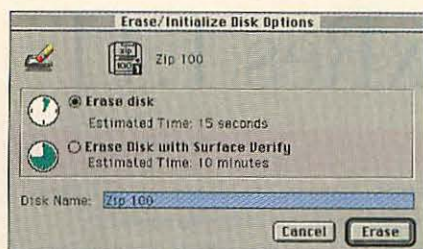
A paper manual provides very basic, but clearly illustrated instructions (an electronic manual, included on the Zip Tools cartridge, gives more details). The SCSI version of the Zip drive can be installed on either a Macintosh or a PC; floppy-based installer disks and instructions are provided for both of those platforms. Once you use the Zip Tools cartridge on one platform, though, it no longer works with the other platform. This means that if you want to install the PC software after you've used the Macintosh software, you have to buy another copy of the Zip Tools cartridge (at \$39.95 from Iomega).

The rear of the drive has two 25-pin SCSI jacks (as opposed to the 50-pin jacks you find on most other hard drives and removable devices), a terminator switch, and a SCSI ID switch (which lets you select ID 5 or ID 6). The lack of the full set of SCSI ID numbers is a minor problem; users with a complicated SCSI chain may be forced to switch ID numbers around to add a Zip drive. There's no on/off switch; the mechanism reverts to sleep or idle mode, however, after 15 minutes of nonuse.

In addition to Iomega's own disk-mounting and -formatting software, Zip Tools also contains a no-frills backup utility, Personal Backup, from Highwire, which is capable of doing simple, scheduled backups; demonstration versions of DiskDup Pro and Virtual Disk (which is my favorite disk-cataloging utility) from Continuum Software; and two demos of games, Bungie Software's *Marathon* and *Pathways*.

The disks look much like regular floppy disks with a weight problem. Each disk is about twice as thick as a regular floppy but offers much greater performance and capacity. Although I didn't do formal benchmarks, I was easily able to get file-transfer rates of from 1000K to 1200K per second (with the Zip drive attached to a PowerBook 540c), which is better performance than most small hard drives offer. Access times are slower than those of a regular hard drive, so the Zip cartridge takes somewhat longer to copy lots of small files (but the difference isn't dramatic). You can initialize your cartridges with the Zip Tools program, or with the Erase command in the Finder, in less than 10 seconds. Formatting a cartridge (with full verification of the disk media) takes about 10 minutes. Formatted capacity of the 100MB cartridge is about 94MB.

As with other removable drives, Iomega uses a system extension to allow cartridges to mount on your Macintosh's



**Zippping through Formatting Options** You can initialize a Zip cartridge with the Finder's Erase Disk command, or you can do a full surface format with this program.

desktop after start-up. For easy portability and installation on other Macintosh systems, Iomega supplies a Guest application that loads the Zip device driver into RAM and lets you mount disks without having to install any drives, control panels, or extensions in anyone else's System Folder. When you insert a cartridge, it appears on a Mac's desktop in less than five seconds.

The Zip drive is an absolute joy to use. Its performance is as flawless as one can desire. The mechanism is nearly silent in operation, except for a slight clicking noise when you insert or dismount cartridges. The cartridges themselves seem robust, and they withstood days of continuous use for file transfers, backups, and reformatting without suffering any ill effects. The media gets a lifetime warranty from Iomega. (The only problem I've heard about was a buggy set of Zip Tools cartridges in the initial shipments of the drive, but these were replaced early on by the company.)

## The Last Word

Iomega's Zip drive combines speedy performance, convenience, and economy in an attractive package. There's little to criticize and much to praise in this product. Early reports are that many dealers are back-ordered because the demand has been so great. But before you buy, consider whether an existing removable

format, such as Bernoulli, optical, or SyQuest, would provide better compatibility if you need to send cartridges to a service bureau or exchange them with other users. Still—and despite the fact that it's a new format—if Iomega can get the media price down, it may have found a replacement for the floppy drive. This is one product I'd buy myself, and that's a lot for an old, jaded reviewer to admit.

—GENE STEINBERG





# xRes 1.11

## Image Editor

**PROS:** Faster than Photoshop; numerical filters; multiple undos; can control the number of brushstrokes to undo; good CMYK and masking functions; requires less RAM than Live Picture.

**CONS:** Slower than Live Picture; can't perform operations in background; no image previews inside Open dialog box; can't undo cropping or deletions; bewildering text tool; interface irregularities. **COMPANY:** Fauve Software (415/543-7178). **LIST PRICE:** \$799.



FAUVE SOFTWARE'S XRES is a cross between HSC Software's Live Picture and Adobe Photoshop—but slightly less expensive and less reliable. Like Live Picture, xRes speeds up image editing by applying edits and effects to just the visible portion of the composition. When you complete the project, you can render the final composition to a separate image. Like Photoshop, xRes lets you paint and edit the contents of layers directly (as opposed to having to create additional cloning and effects layers, à la Live Picture). And, like Fractal Design Painter, xRes has natural-media brushes and paper textures.

### Resolution Technology

Both xRes and Live Picture are designed for creating large compositions full of high-resolution images. You start out by converting an image to a proprietary format—LRG in xRes, IVUE for Live Picture—that stores an image several times, in progressively smaller resolutions. (You don't have to convert an xRes image to the LRG format, but the program's performance suffers if you don't.) As you edit, the software grabs chunks of the image and uses them as full-screen proxies to display the results. The programs store edits in a separate composition file—XRS for xRes, FITS for Live Picture—thus preventing permanent damage to the original image. Finally, after you've edited the composition, you can render it out to a separate image file.

But beyond these similarities, xRes and Live Picture go their separate ways. For example, Live Picture's brushstrokes are independent mathematical objects, with no inherent resolution. By contrast, when you paint or clone in xRes, the brushstroke has the same resolution as the image on which you paint. The brush-

stroke even adopts the resolution of the base image on a new layer. This makes cloning in xRes more flexible, but makes rendering the final image less flexible.

Both xRes and Live Picture are faster than Photoshop at opening optimized files and applying brushstrokes. But Live Picture outpaces xRes in other common operations. For example, on my Power Mac 7100/66 with a 21-inch monitor, a typical transformation took 5 to 10 seconds in xRes versus less than a second in Live Picture. (I used a 52MB file, but file size has almost no bearing on performance.) xRes applies filters more slowly, while Live Picture limits you to vague brush-on effects. Zooming and scrolling are nearly instantaneous in both programs. However, Live Picture redraws the new screen pixels automatically; in xRes you manually initiate the redraw, which can take as long as 30 seconds, during which time you can't switch apps.

### Good Ideas Gone South

To its credit, xRes supports more file formats than Live Picture. But while it can open PICT files, for example, xRes is incapable of decoding QuickTime JPEG compression, nor can it preview images inside the Open dialog box. The program also opens Photo CD files but doesn't dim the option for 496-by-644-pixel Pro Photo CD resolution when perusing a list



**Text Trouble** The Text Tool dialog box initially highlights the Size option box, even though the main text-entry box is active. If you select a Style check box, xRes mysteriously activates the Size option box.

of standard Photo CD scans. If you try to open a regular Photo CD image at Pro resolution, xRes delivers a series of empty alert boxes. You can plod through these invisible error messages by pressing the return key 10 or 20 times, but your reward is a 72MB window full of black.

A theoretical advantage xRes has over Live Picture is multiple undos. On the plus side, xRes can undo up to ten oper-

ations per layer, and you can change the number of undos without quitting the program. You have complete control over undo intervals, so you can make a series of brushstrokes equal to one undoable operation. There's also an undo eraser for making partial reversions. But you cannot countermand the movement or transformation of a layer, the cropping of a composition, or the deletion of an image. To make matters more confusing, the Undo command never lists the operation it's prepared to rescind. And, guess what—there's no Revert command.

Version 1.11's text tool lets you enter text into a dialog box much like the one in Photoshop. But the dialog box presents you with conflicting signals. For example, when the dialog box first opens, the contents of one option box are highlighted, while an insertion marker blinks in another. Characters entered from the keyboard appear in the latter option box, even though the former continues to be highlighted. Meanwhile, you have no control over leading or letterspacing, and the program doesn't automatically kern. However, xRes does redraw text at a higher resolution after you enlarge it.

### The Last Word

xRes includes a wealth of prepress-quality CMYK-conversion controls. (Note, however, that as with Live Picture, you can't print from the program.) Its solid masking functions and brush modifiers go beyond what you find in Photoshop. It includes a host of useful filters, though the previewing functions need fleshing out. It supports Photoshop-compatible scanner-acquire modules, it supplies lots of customizable (though quirky) gradient options, and it runs in only 16MB of RAM, all advantages over Live Picture.

But sadly, the program's oddities are enough to give the most patient user pause. Cursors don't always correspond to the current action and can even carry over into other programs. You can't simply drag a selection to move it; you have to first float it onto its own layer. When transforming a layer, you have to position a tiny cross on the cursor exactly over a corner handle or xRes ignores you. The image window lacks a zoom box, so you can't snap the window to the visible image size. You can't delete a layer by simply pressing the delete key; you have to choose a command and endure an alert message. If fate deals you an 8-bit monitor for a day or two, you'll find that xRes can neither dither nor optimize the color lookup table. For a program geared specifically toward imaging professionals, xRes is unacceptably slipshod, despite its potential.—DEKE MCCLELLAND



# Pictura 310

## Color Printer

**PROS:** Inexpensive. **CONS:** Mediocre color-matching scheme. **COMPANY:** Fargo Electronics (612/941-9470). **LIST PRICE:** \$4995; optional Adobe PostScript Level 2 Software Package \$795.



**A**T A STREET PRICE OF AROUND \$4000, the Fargo Pictura 310 is the most affordable tabloid-size dye-sublimation printer available today. Priced well below its competitors, the Pictura supports both thermal-wax printing and photo-quality dye-sub output. Despite minor problems and a dearth of color-matching abilities, this printer may win cost-conscious customers away from its much more expensive competitors.

Like the Radius ProofPositive and the 3M Rainbow, the Pictura 310 supports full-bleed tabloid-size printing and prints up to 12-by-18-inch documents. It also supports a wide range of paper sizes, as well as other print media like transparency film and T-shirt transfers.

### CPU-Based Printing

The Pictura 310 uses a parallel interface, instead of the SCSI connections of the ProofPositive and 3M Rainbow, and it uses the host CPU for rasterization. Therefore, the faster your Mac, the faster the rasterizing. Background printing taxes your computer by using CPU cycles, RAM, and hard disk space, however. The minimum system requirements are 8MB of RAM and 20MB of hard disk space; Fargo recommends 32MB of RAM and a hard drive with 150MB available.

There are two drivers available for the Pictura: the QuickDraw-based RasterSoft driver, which comes with the printer, and the PostScript-based CPSI (Configurable

PostScript Interpreter) driver, a \$795 software option developed by Adobe for Fargo that adds genuine PostScript Level 2 capability to the printer—a necessity for users of Adobe Illustrator, Macromedia FreeHand, and QuarkXPress. CPSI also allows users to share the Pictura 310 on a network. Neither driver is Power Mac native.

Fargo should consider adding an Adobe Photoshop export module. Based on my experience with other printers, a Photoshop export driver offers at least a twofold speed increase over the regular PostScript driver.

The Pictura 310 could achieve neither the promised 2 minutes per page for thermal wax nor 10 minutes per page in dye-sublimation mode. Expect to wait at least 5 minutes per page for a thermal-wax print and more than 15 minutes per page for a dye-sublimation printout of decent size and complexity.

### Acceptable Print Quality

Like most of its competitors, the Pictura 310 generates nice continuous-tone photo-realistic quality in dye-sublimation mode. The printouts showed a slight shift in color and were more saturated than I would like. The thermal-wax printouts, while not as crisp as the output from some other low-end thermal-wax printers, were truer to the original images' colors than the dye-sublimation printouts were. The quality of text output was mediocre compared with that of the ProofPositive and the 3M Rainbow. While the QuickDraw driver supports antialiasing options for text, the CPSI driver doesn't.

### Best of Both Worlds?

Having both dye-sublimation and thermal-wax technology in one printer is useful. For preliminary designs, you can print in thermal mode, switching to dye sublimation for final prints, and thus save a lot of money in consumables.

To switch between thermal-wax and dye-sublimation modes, you need to

change the ribbon type and the paper (the Pictura uses different ribbons for different modes), and then select the correct settings in the driver's page-setup dialog box—a process that could be simplified. For users who constantly switch between dye sub and thermal wax, the \$249.95 optional paper tray is worth considering.

I also noticed that tiny specks of ink had chipped off of the first few prints. This problem usually happens after switching from one ribbon type to another, but after several prints in the new mode, the problem disappears.



RICHARD NETHAMETER

### Poor Color Matching

Advertised as a printer for proofs, comps, and prepress work, the Pictura 310 will have to overcome a big obstacle—color matching—to compete with the ProofPositive or the 3M Rainbow, both of which come with excellent color-matching software. The Pictura 310, on the other hand, has a couple of proprietary color-management schemes and supports basic Apple ColorSync, but nothing proved effective. I had no luck at all getting the dye-sublimation output to match a commercially produced MatchPrint. Also, I had problems color-matching thermal printouts to dye-sub prints. This makes it impractical to correct color in thermal mode before printing the final in dye-sublimation mode. According to Fargo, Agfa and Kodak are working on aftermarket profiles that should be available at a reasonable cost by the time you read this. Still, Fargo should bundle at least one of the profiles with the printer.

I encountered a couple of glitches while using the Pictura. For example, although the printer was running, I ran into occasional printer-not-ready messages (usually fixed with a printer restart).

### The Last Word

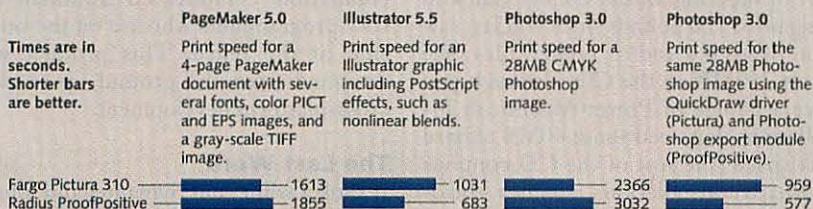
As of now, if you can live with its shortcomings, the Fargo Pictura 310—coupled with the CPSI driver from Adobe—represents a good value in a tabloid-size dye-sub/thermal-wax printer. To take full advantage of it, you should invest in a color-management package.

—MARK HURLLOW



## How Fast Is the Pictura 310?

Times are in seconds. Shorter bars are better.



### BEHIND OUR TESTS

Macworld Lab tested the printers using a Macintosh Centris 650 with 40MB of RAM and an external 1GB hard drive. We used the CPSI (Configurable PostScript Interpreter) driver for all tests except one Photoshop test, as noted.



# Symantec C++ 8.0

## C++ Compiler for Power Macintosh

**PROS:** Great class browser; very nice editor; Visual Architect speeds interface design; project manager eases development bookkeeping.  
**CONS:** Minor glitches; some support gripes; demands lots of resources. **COMPANY:** Symantec (503/334-6054). **LIST PRICE:** \$499.



SYMANTEC'S THINK C AND Think Pascal are the most popular Mac compilers of all time. At the time the Power Mac was being designed, Think C and the Think Class Libraries were probably the modern environment most used for small and medium-size development projects, with Apple's Macintosh Programmer's Workshop (MPW) being reserved for bigger, large-team commercial projects.

Therefore, it was a major disappointment for thousands of programmers that Symantec took so long to get a native Power Mac version of its C++ development system out the door. But the whole native Power Mac development system is here now, after almost two years of Symantec's efforts with TRex, Crossbow, and safari hats.

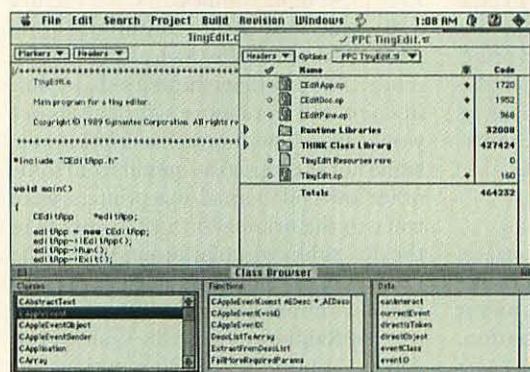
### Everything and More

Symantec C++ 8.0 (SC++ 8.0) is a complete professional development environment with native, optimizing PowerPC compilers for C++ and ANSI C. This new version includes a project manager that's better suited to large-scale program development than is the already quite competent project manager in earlier Symantec and Think packages. Since the project manager supports AppleScript and nested projects, it's possible to design all sorts of automated project-management routines and have the project manager build 680X0 or Power Mac applications. The SC++ 8.0 editor supports multiple fonts, colors, and styles, as well as automatic formatting, scripting, and split panes. I think it's as good as or better than any stand-alone programmer's editor on the market.

Visual Architect is not, as the name suggests, a visual programming tool like ProGraph, but it is a valuable tool for quickly developing attractive interface elements, and it's a unique feature of the Symantec environment. This version of the class browser has clearly been influ-

enced (in terms of features) by the ongoing example of ACI US's brilliant Object Master (see "Go Ahead, Browse"). The original Think Class Library, a traditional favorite, has been updated for 680X0 and Power Mac support. The Symantec debugger goes far beyond those offered in the Metrowerks or MPW Power Mac compilers, with very nice multiwindow displays (including stack view and data view). Professionals will probably still prefer Jasik Designs' The Debugger, but Symantec's is certainly an impressive "free" debugger.

Symantec, belatedly recognizing some responsibility to rescue stranded Think Pascal users, has announced an agreement with Language Systems to make LS Pascal an add-in. In fact, the development environment has been designed to accommodate any kind of



**Go Ahead, Browse** The highly evolved class browser in Symantec C++ 8.0, used with the integrated Think Reference, makes this colossally complex product accessible even to beginning programmers.

third-party compiler, so the millions of lines of FORTRAN code that still constitute much science and engineering software may find their way to the Power Mac through this Symantec backdoor.

### Fat City

Of course, the product as delivered on CD-ROM will produce, in old Think product hands or 6.0 buffs, a shock like that of meeting an old college pal who has gained 120 pounds since you last saw him. SC++ 8.0 and its related files take about 250MB on the CD, although you have a choice of Power Macintosh installations that need about 40MB of hard disk space (the rest of the CD contains alternative installations, goodies, third-party files, the 680X0 development systems, and documentation).

Hard disk space isn't the size problem, however. Symantec claims that you

can do Power Mac development on a Power Mac with a mere 16MB of RAM. This claim needs to be modified. You can use SC++ 8.0 with 16MB of RAM for most real programs only if you use virtual memory, which slows building and compiling to a crawl. From a little statistics program (80K of source code, originally written in Think C 6.0), SC++ 8.0 can generate a compiled application in 9 seconds on a 7100/66 with 24MB of RAM (virtual memory off); the comparative time on a 6100/60 with 16MB of RAM (virtual memory on) is 7 minutes! Symantec is working on this problem, but if you're serious about using this product on big projects, you may as well order more RAM.

You can optimize the compiled code for speed or for minimal application size, but not both. Compiled code quality is very good—I produced smaller and faster Power Mac apps from my source test suite with SC++ 8.0 than with Metrowerks CodeWarrior 5.0, although a new version of CodeWarrior should be available for further comparison in summer 1995.

### Facing Off

Most potential Power Mac programmers will have to make the basic choice: Metrowerks CodeWarrior 5.0 or Symantec C++ 8.0? CodeWarrior has the advantages of simplicity, compactness, and a reputation for excellent support. Symantec's product is a more polished development environment and has the advantage with its editor, class browser, and compiled code.

Its support reputation, however, is something the company is currently working to overcome. But if you have been using Symantec products all along, SC++ 8.0 can make you a first-rate Power Mac developer with only trivial installation effort, which is likely to tip your decision balance to Symantec.

Although you cannot simply set a Symantec switch and recompile for Windows, the company does offer a highly compatible compiler environment for C++ programmers who are on the other side of the fence. This product was designed from the ground up to ease cross-platform development.

### The Last Word

It took a while, but Symantec did lots of good work on SC++ 8.0 during its long incubation. It offers a feature-rich, friendly environment and laudable compiled code quality.—CHARLES SEITER



# Fujitsu ScanPartner Jr.

## Desktop Scanner

**PROS:** Compact; one-button operation; built-in ten-sheet feeder; bundled with good OCR software. **CONS:** Can't handle rigid originals or documents wider than 8½ inches; OCR software saves only in black and white. **COMPANY:** Fujitsu Computer Products of America (408/432-6333). **LIST PRICE:** \$499.



FUJITSU'S BUNDLE OF THE SCANPARTNER Jr. scanner and Xerox's TextBridge 2.0.4 makes converting hard-copy documents to editable text about as easy as making toast. For less than you'd pay to outfit a flatbed scanner with a sheet feeder and OCR software, you get the one-button convenience of a toaster in a device about the size of a loaf of bread. It's perfect for any office that's rife with letters, contracts, articles, or other hard-copy documents that need to be captured for editing, annotation, or layout.

Just drop up to ten letters, magazine pages, hard-copy faxes, or other documents into this compact page-grabber's feeder, and click on the Go button. The sheets slide smoothly through at 20- to 40-second intervals while the TextBridge software translates each page into WriteNow, WordPerfect, MacWrite, Microsoft Word Rich Text Format, or one of a clutch of MS-DOS word processor formats. For two-sided documents, just scan the odd-numbered pages first, then flip the stack and run the even-numbered pages through. TextBridge retains the correct order. (Note: while the ScanPartner Jr. can capture at 300 dpi in 256 gray tones, TextBridge saves its TIFF or PICT files in only black and white.)

The ScanPartner Jr. can't handle books and thick or inflexible sheets (which can't feed through the thin slot and make the required 90-degree turn), or anything wider than 8½ inches or much narrower than the 4-by-6-inch sheets recommended for use with the automatic document feeder. In my tests, thin, odd-size, wrinkled, or otherwise troublesome documents fed through manually, albeit with some difficulty. Pages torn from *Macworld*, for example, often slipped and skewed.

The ScanPartner Jr. fits anywhere you can find 12 by 4 inches of free space, and at 3½ pounds (plus about a pound for the power brick) it's small enough for portable use. TextBridge calls for 8MB of RAM, but it'll run with 4MB of real mem-

ory and another 4MB of virtual memory—with a performance penalty.

Don't be fooled by TextBridge's minimalist dialog box, which shrinks down to include only four decisions: File or Scanner input; Text or Image output, or both; and whether you want to use pop-up Preview and Verifier windows. This is a laudably accurate and powerful OCR program. (For a comprehensive review of TextBridge, see *Reviews*, *Macworld*, September 1994.)

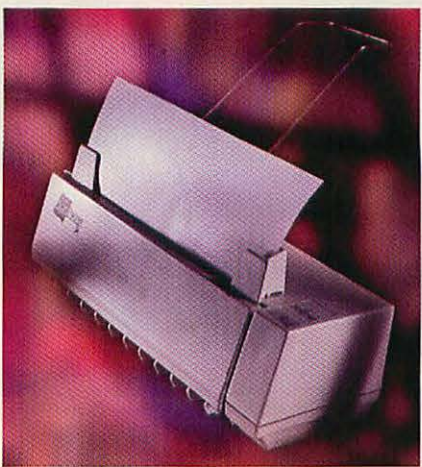
You can set TextBridge to work with either portrait- or landscape-oriented documents, or you can have it auto-sense orientation, which takes a little longer. The software is smart enough to handle pages with, say, text in portrait orientation and landscape-oriented charts.

TextBridge's accuracy depends highly on the quality of the originals. In my tests, using a 30-page mixed bag of submissions for a newsletter, laser-printed, 300-dpi pages with 12-point type yielded only three or four recognition errors per page. TextBridge also did a fine job on some typewritten pages (eight to ten errors per 1000-character page); the only test that caused it to choke was a hard-copy fax of a 9-pin dot matrix original. It recognized so few characters that retyping the document would have been faster.

## The Last Word

If you have a manila folder full of hard copy, but what you want is a Mac folder full of text files, the ScanPartner Jr. plus TextBridge offers an economical and fuss-free solution. Its focus on doing one job well means you don't get all the flexibility and capabilities of a flatbed scanner, but for small businesses, law offices, and individuals who work more with text than pictures, this bundle is a really good deal.

—DAVID D. BUSCH



# FileWave 2.1.2

## Software-Distribution Tool

**PROS:** Remote updates occur during idle time; automatic file-transfer recovery; site-managed copy protection. **CONS:** No file-set creation tools. **COMPANY:** Wave Research (510/704-3900). **LIST PRICE:** \$895.



BECKMAN'S LAW STATES THAT TIME spent maintaining software on a LAN increases as the square of the number of users. That's because more users mean a wider variety of software packages that need to be updated at increasingly frequent intervals. FileWave automates this process, letting you maintain a central repository of files and distribute them—and any future updates—unobtrusively to network users.

FileWave consists of three components: a program that runs on a server Mac and creates a central repository of files, an administration tool that runs on the administrator Mac, and a user extension for each target user's Mac.

FileWave is a complex product, but its drag-and-drop Finder interface mitigates its complexity somewhat. You carry out all tasks directly from the administrator Mac's desktop, starting with mounting the repository server as a shared volume just as you would any AppleShare volume.

Once mounted, FileWave's repository volume looks like any other shared volume, but it's actually a temporary partition of the server Mac's hard disk. It contains the files you want to distribute and two folders named Files and Users.

Distributing files with FileWave is a four-step process. First, you create subfolders (called file sets in the Files folder and user groups in the Users folder) that contain the applications you want to distribute and that represent the users to whom you're distributing.

Second, you tell FileWave where on each user's machine to store individual files in a file set. You do this by ⌘-dragging the files to special target folders. FileWave limits you to two general target locations: the user's System Folder (and its subfolders), and a temporary disk partition created by FileWave on each user's machine.

Third, you drag and drop the entire file set to destination user groups. And fourth, you select the Update Model item from FileWave's menu in the Finder.

*continues*



Tiny had the hard part.  
Scanning it was easy.



#### AMAZING TRICKS



*"What some of us will do just to get noticed.  
An autobiographical essay by Katherine Blum."*

### Introducing HP ScanJet Scanners

They're simple to set up. Even simpler to operate. And with software that makes scanning more automatic, using HP ScanJet scanners has never been easier. The new HP ScanJet 3c now offers internal 30-bit color at 2400-dpi enhanced resolution (600-dpi optical), and also includes free Corel PHOTO-PAINT for PCs.\* The HP ScanJet 3p delivers 1200-dpi enhanced resolution (300-dpi optical). Both come with OCR software. For more information, call 1-800-SCANJET, Ext. 9232.<sup>†</sup>



Grayscale - \$599



Color - \$1,179

The easiest thing  
you'll do all day.

\*For Macs, free Adobe Photoshop LE.™ Suggested U.S. list prices. †In Canada, call 1-800-387-3867, Ext. 9335. ©1995 Hewlett-Packard Company PE12526



**HEWLETT®  
PACKARD**



This kicks off the distribution process.

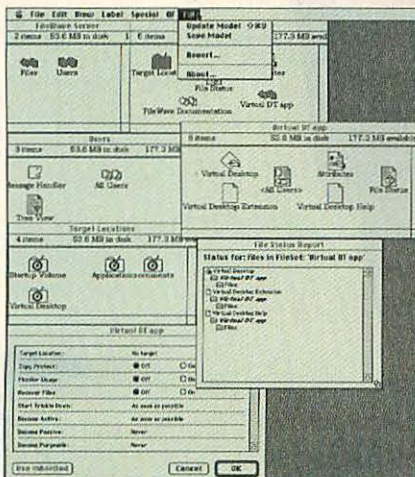
FileWave distributes files simultaneously to all users, moving data only when a user's machine is idle. This makes distribution completely transparent to users and puts no adverse load on the LAN. If a user shuts down in the middle of a transfer, FileWave picks up where it left off when the user restarts the Mac.

FileWave incorporates several features that add to its utility. You can specify copy protection for distributed files; this prevents users from copying or duplicating them. You can also tell FileWave to move replaced files to a recovery folder rather than delete them. To help monitor compliance with site licenses, you can view statistics on the number of concurrent users for a given package. You can track distribution and perform version control. And at any time you can have a user's application set rebuilt from the repository—a useful feature for recovering crashed machines.

Building the file sets proves to be FileWave's one major inconvenience. To distribute a package such as Microsoft Word, you must know where that application places all of its components. A tool that would compare volumes before and after performing a model installation and automatically build the distribution file set would be useful. The package includes a booklet outlining installation details for a handful of programs; it's an aid, but it's hardly comprehensive.

## The Last Word

Were it not for the familiarity of its Finder-based user interface, FileWave's complexity would be a hindrance. But once you understand what to do, you'll remember it—and save untold hours distributing files.—MEL BECKMAN



**Drag-and-Drop Action** FileWave's Finder-based interface lets you load the FileWave repository, register users and groups, initiate distribution, and generate reports, all from the administrator's Mac.

# CD-Q 2.0

## Photo CD Plug-in Utility

**PROS:** Robust, on-the-fly color correction and separation from Photo CD YCC format.

**CONS:** Small previews; poor documentation.

**COMPANY:** Human Software Company (408/741-5101). **LIST PRICE:** \$145.



**K**ODAK'S YCC FORMAT FOR PHOTO CD makes possible more than just digital photographs on a CD-ROM. It offers six levels of resolution (up to 4096 by 6144 pixels—enough to print a slide at 17 inches at a 175-line screen), plus excellent compression. And Photo CD processing is widely available to consumers. However, to use a YCC image file in printing or presentations, you must first convert it to a format that your applications can use.

CD-Q, an Adobe Photoshop plug-in, lets you set conversion and correction parameters, such as cropping or fine-tuning color separations, before opening your Photo CD files. It works with any image processor that supports Photoshop plug-ins.

From CD-Q's main screen you choose one of three color models to open your YCC file: gray scale, RGB, or CMYK. You also choose a scheme for making color corrections—RGB, Gradation, or for the less experienced user a variations-style Image Picker. Tools that crop, rotate, mirror, and sharpen, plus controls for setting image resolution and for varying the generation and intensity of a black plate, are also in the main screen. An online densitometer in CMYK and RGB modes lets you sample colors and adjust highlights, midtones, and shadows in the composite image.

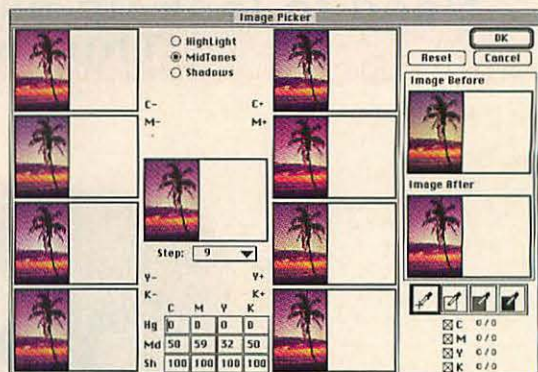
## Correcting Colors

If the ultimate destination of your images is on-screen display, you choose the RGB mode from CD-Q's main screen. In RGB mode, slider bars let you control the red, green, and blue channels individually, as well as overall saturation and brightness. The RGB mode also offers nine predefined monitor profiles for adjusting your display, although no monitor types or color temperatures are given for the settings. If some of the colors fall outside the gamut, a clipping alarm shows which pixels are affected. (It would be more con-

venient if the monitor and gamut-alarm controls were on the main screen.)

If your Photo CD images are destined for four-color printing, you enter the Gradation area from CD-Q's main screen. Here, instead of the sliders in RGB mode, you adjust graphed Bézier curves for the cyan, magenta, yellow, and black channels. Unfortunately, the graphs are smaller than the equivalents found in Photoshop, making them harder to use. (Pressing the shift key while selecting the Gradation mode brings up a version with before-and-after thumbnail images—a strange option, since you can preview your corrections in either version.)

CD-Q's simplest way of correcting CMYK colors is to use the Image Picker, which presents thumbnail previews that show how additions or subtractions to any of the CMYK channels compare



**Channel Surfing** Thumbnail selections in CD-Q's Image Picker let you preview alterations to each CMYK channel.

with the uncorrected image. You can also vary the colors in the HighLight, Mid-Tones, or Shadows ranges separately. It's more intuitive, but the Image Picker's small thumbnails limit its usefulness. You can save any setting in CD-Q to files from any of the various modes for later recall.

A vignette feature lets you make the edges of your pictures fuzzy. (You can also blend between a portion of your image and any solid color.) You choose from eight predefined vignette shapes or create new shapes with a spray-can tool. Although this capability is handy, its interface is confusing and it could use a greater variety of brush shapes.

## The Last Word

While Photoshop has equivalents of all these features, and implements them in a more straightforward manner, it does not access the YCC format as directly as does CD-Q. If you frequently use Photo CD for much of your image processing and don't mind an inelegant interface and perfunctory documentation, CD-Q can be a good addition to your image processing suite.—MATTHEW C. NIELSEN





With Select Phone, the fishin' is easy. Say you're a supplier, and you want to look up tackle shops. Key in "fishing" under business type, the area code or zip code for the area you're interested in, and — *gotcha* — there they are. So who do you want to find?

If you're fishing for new business, here's a fantastic place to cast. Select Phone, the extraordinary Phonebook on CD-ROM, gives you access to the white and yellow page directory listings of every city in the U.S. — *over 84 million residences and businesses*. That's a lot of bytes. And there's a lot of ways to haul in your catch: Search by name, street address, city, state, zip code, area code, phone number, even business heading or SIC code. Zero in on a particular listing. A long-lost friend. An obstetrician on Oak Street. Or cast your net a little wider. Tackle shops in Toledo. *Select Phone lets you search for anyone, anywhere, any way you want. You're in control.* Then, call the names you find, mail to them, or export them to your own word processor. It's like shooting fish in a barrel. For the names of software stores carrying Select Phone, call 1-800-99-CD-ROM. Online go to [sales@procd.com](mailto:sales@procd.com) or visit our world wide web site at <http://www.procd.com>.



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This will reel 'em in.**





# Vista-S8

## 24-Bit Color Flatbed Scanner

**PROS:** Clear, crisp, high-quality line-art scans; decent reproduction of color and gray-scale artwork; fast artwork previews; easy setup.

**CONS:** Somewhat slow OCR scanning; scanning software has bugs. **COMPANY:** Umax Technologies (510/651-8883). **LIST PRICE:** LE+ version \$995; Pro+ version \$1095.



THE UMAX VISTA-S8 SCANNER HAS A lot of useful features for its low price. It's a single-pass, flatbed, 24-bit color scanner, offering 400-by-800-dpi optical resolution. It uses a technology called Ultra-View to provide an interpolated resolution of 6400 dpi (far greater than any printer would need). Umax includes its MagicMatch software for calibrating color between the scanner, monitor, and output devices; as well as VistaScan, for general-purpose scanning. VistaScan comes as a plug-in for Adobe Photoshop or as a separate application that can be used without running Photoshop.

The lower-cost version of the Umax scanner package, the LE+, includes Adobe Photoshop LE, Caere's OmniPage Direct software for optical character recognition, and a Corel Professional Photos CD-ROM. The Pro+ version includes the full version of Photoshop, HSC Software's Kai's Power Tools and Kai's Power Photos CD, Pixar Typestry, and Pixar 128.

Installing the Vista-S8 is easy. The rear panel includes a knob for locking and unlocking the optical components (locking protects them during shipping), a SCSI ID selector switch, SCSI jacks, and an on/off switch. An additional jack is provided for installing an optional transparency adapter or automatic document feeder; neither of these items was tested for this review.

The VistaScan plug-in includes a decent selection of image-adjustment tools. There's a reasonably accurate auto-density feature that sets the best highlight and shadow values for your artwork. In addition to allowing you to manually adjust for highlight and shadow, VistaScan offers settings for gamma, image size, and resolution; as well as filters for

blurring and sharpening the image. A de-screen option is also included. It removes the dot pattern from halftoned images.

The software works relatively well, but it does have a few problems. You can use a selection rectangle to manually crop the area to be scanned, but the bottom of the artwork tends to overscan slightly (extending 20 or 30 pixels beneath the rectangle). Also, the stand-alone version of VistaScan didn't work during my tests (using my Power Macintosh 8100/80, running System 7.5.1); I couldn't get it to acquire an image. I talked with several representatives of Umax technical support, but they were unable to offer a solution. Both versions of the scanner come with Photoshop, so the problems I encountered were merely inconvenient; using the plug-in was an effective solution. Still, it would be preferable if the stand-alone software worked.



ERIC HARTGER

One of the Vista-S8's biggest advantages is speed—it takes seconds to preview just about any artwork you throw at this unit. Even final scans of 1200-dpi line art are acceptably quick. The image quality of color and gray-scale art was good, with decent rendition of midtones. In cases where the VistaScan software could not bring out the best image quality, Photoshop made up the difference. I did not attempt to see the quality of an interpolated 6400-dpi image—the resulting file's size would exceed that of most users' hard drives, and even the best image-setters are incapable of reproducing anything of that resolution. But interpolated 1200-dpi line art looked just fine when reproduced on my 600-dpi laser printer. Optical character recognition was a tad on the slow side, taking about 50 seconds to interpret a letter-size page.

## The Last Word

For less than a grand, the Umax Vista-S8 is a good value. If you can overlook the slow OCR, and the software problems, you'll find your money well spent on this scanner.—GENE STEINBERG

# PhotoFlash 2.0

## Image-Editing Utility

**PROS:** Well-integrated AppleScript support; good drag-and-drop cataloging features; includes scripts for automatically placing images in page layouts. **CONS:** Limited image-retouching tools; searching catalogs by sketch or similarity is rarely effective. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** \$129.



PHOTOFLASH IS APPLE'S OWN PHOTO-enhancement and -cataloging program. While it doesn't offer the image-editing power of Adobe Photoshop, it does provide the basic tools you need to enhance, resize, and retouch images acquired from a scanner or digital camera and then organize those images for placement in desktop publishing programs. With the release of version 2.0, Apple has vastly improved the program's cataloging features, added support for the Apple QuickTake 100 digital camera, and cut the price in half.

PhotoFlash handles images saved in PICT, TIFF, JPEG, Photo CD, EPS, and DCS file formats. (It can also read native Photoshop files but can't save files in that format.) You can easily convert files from one type to another, employing any of several file-compression options.

The program's image-enhancement tools cover the basics: brightness, contrast, overall exposure, and color balance. But PhotoFlash doesn't include tools for editing individual color channels, creating masks, or applying sophisticated special effects. (The program does support many of Photoshop's plug-in filters, but it's not compatible with some of the more powerful distortion filters.)

The 14 tools on PhotoFlash's tool palette include a variety of standard selection tools, as well as tools for cropping, resizing, rotating, blurring, and sharpening. Two unique tools are DeDust, which automatically removes specks in otherwise solid fields of color, and DeScratch, which removes thin scratches that might mar a scanned image. Predictably, it's sometimes difficult for PhotoFlash to distinguish between genuine hairline scratches and normal portions of a complex image, so these tools must be used with caution. Fortunately, you can fine-tune their sensitivity using the Enhance dialog box.

PhotoFlash includes cataloging features that let you quickly organize groups

*continues*



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1 2 3 4

### Mac P & L

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1 2 3 4

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1

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1 2 3 4

### Now Contact & Now Up-To-Date

1

### PageMaker

1 2 3 4 5 6

### Painter

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### Peachtree Accounting

1 2 3

### Persuasion

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### Photoshop

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### QuickTime

1

### SuperPaint

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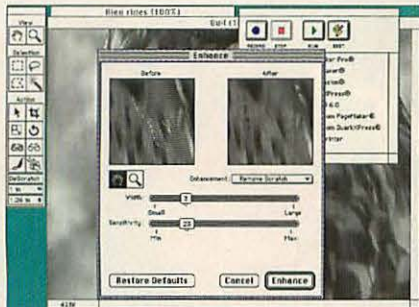
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of images in searchable catalogs. Images are displayed as thumbnails and can be sorted by file name or date. You can add an image to a catalog simply by dragging the image's icon onto an open catalog window. PhotoFlash can catalog the contents of an entire disk by scanning the disk for images and adding to the catalog each one that it finds.

You can search catalogs by file name or by a specific string of caption text, and PhotoFlash will create a new catalog containing images that meet the search criteria. Version 2.0 also allows you to search by sketch—you draw a crude thumbnail using a few basic painting tools, and PhotoFlash will find images that roughly match your sketch. In addition, you can search for an image by similarity; choose an image, and PhotoFlash will automatically select any other images that match it in basic color and composition. I found that PhotoFlash had more misses than hits at finding images based on sketch or similarity, but the feature can be useful as a last resort.

One of PhotoFlash's real strengths is its extensive support of AppleScript. PhotoFlash comes with several useful scripts that automate the program's functions and integrate it with other applications. Scripts can place an image in QuarkXPress, PageMaker 5.0, Persuasion 3.0, Word 6.0, and FileMaker Pro 2.1 layouts. To record a new script, you simply click on the Record button located on the floating script palette, perform a series of actions, and then save the script.



**Photos from Scratch** PhotoFlash includes tools designed to wipe out scratches and specks that appear on photographs. The Enhance dialog box shown here lets you fine-tune the behavior of the tools and preview their effectiveness.

### The Last Word

PhotoFlash doesn't have the image processing capabilities of Photoshop—but it also costs about \$800 less. It handles all the basic image-enhancement tasks a casual desktop publisher is likely to need and provides a simple, uncluttered interface for organizing images, improving their general appearance, and placing them in other programs.—JOSEPH SCHORR

## CreativePartner

### Network System for Creative Media

**PROS:** Intelligent approach to working with creative content over a network; faster transmission speeds than LocalTalk; tracks job traffic for project billing and administration. **CONS:** High price; weak implementation of text memo labels; can't transmit folders; lacks some sophisticated integrated-production tools. **COMPANY:** emotion Inc. (415/812-9000). **LIST PRICE:** \$1500; five copies plus administrator's license \$7500.



**F**OR MEDIA PRODUCERS, THE venue for creative group collaboration is moving away from the cozy oval conference table and toward a wider circle of networked contributors. To facilitate this long-distance idea sharing, emotion Inc. has developed CreativePartner, a distribution system for video, sound, text, and graphics.

CreativePartner is a networking solution for people who think visually and communicate best by pausing a videotape and gesticulating around a TV monitor or scribbling across a project storyboard. Now, instead of faxing your producer the fifth-generation copies of your sixth revisions, you can draw or comment over a QuickTime movie and send it quickly to the dispersed creative team for review.

### Bouncing Ideas Around

Using emotion Inc.'s CreativeNote annotation system, CreativePartner cleverly stores comments in a separate overlay file, making it unnecessary to send the original movie file after every round of changes. The product also logs all information exchanges for easy tracking, schedules delivery times, groups recipients for batch transfers, and even copes well with the imperfections of network transmission. When a connection is broken, CreativePartner reestablishes the connection and resumes transmitting data from the point of interruption—something that will appeal to anyone who has tried to transmit a 200MB file and had to resend everything from scratch after a last-second glitch. Last, I must laud how efficiently data is packeted and processed. The session-layer interface for AppleTalk has been optimized for large files, resulting in transfer rates that are two to three times as fast as unenhanced AppleTalk.

### Not the Full Nine Yards

This is all extraordinarily nifty, but the product loses some luster when you stop

to consider its price. The distribution and reviewing systems are useful, but for the price, I expect more from software claiming to be my partner. Often there is no way to establish the viability of an idea other than to try it out—and let's face it, CreativePartner is partly competing against my ability to make some media revisions and throw them on an optical disk or VHS tape and courier them to other members of my team. CreativePartner's annotation tools convey basic feedback, but I'd like to see additional tools that would enable you to better visualize effects, compositing, or rough edits without manipulating the movie in a complicated stand-alone program. It would also be useful to have simple scripting functions so someone could send various visual samples and



**Note Changes** CreativePartner not only accelerates file-transmission speed, but it also allows users to type or scribble annotations right on top of QuickTime images.

have them play in a specified sequence without having to spend time editing the pieces together.

### The Last Word

It's hard not to get excited about a product that shows me a glimpse of how I'm likely to work in the near future. And in my enthusiasm to embrace this future I can cheerfully ignore some of the version 1.0 annoyances, such as the inability to send a folder of data, or how the interface makes it easy to overlook the "label" (CreativePartner's version of a cover page). For high-end production outfits that have already invested in a hefty ATM bandwidth, the price of CreativePartner licenses might seem a pittance, and such users may find the significant improvement in network transmission speed alone worth the price.

However, I can't help thinking that the product should either be more modestly priced or have a more generous feature set. At this point, CreativePartner feels more like a CreativeAssociate and shouldn't be given a partner's salary.

—AVI HOFFER



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# Multimedia Utilities 1.1

## QuickTime Utilities

**PROS:** Versatile utilities; excellent screen recorder.  
**CONS:** Numerous bugs and rough edges; skimpy manual. **COMPANY:** Motion Works (415/541-9333). **LIST PRICE:** \$299.



**M**ULTIMEDIA UTILITIES IS AN INEXPENSIVE set of six utilities that address most aspects of QuickTime moviemaking, from editing movies and sound tracks to creating morphs, animations, and screen recordings. Sound appealing? It is, and would be more so were it not for some design quirks and enough bugs to scare a can of Raid.

CameraMan 2.5, also available separately, lets you create QuickTime movies of Mac screen activity. You can record full-screen movies or use a framer window to capture only part of the screen. CameraMan lets you simulate smaller screen sizes, too. It can also record simulated mouse-click, keystroke, and error-beep sounds, as well as a live sound track. In all, it's a versatile utility and the crown jewel of the package.

QuickEdit 1.1 is a simple QuickTime movie editor. With it, you can combine movies, create simple cuts between them, and add sound tracks. QuickEdit provides no fancy transitions, such as dissolves, although you can superimpose multiple video tracks and specify how they interact. The latter feature is handy, but you must experiment to find which options do what; the manual barely touches on each utility's advanced features.

A more serious problem is that QuickEdit crashes often. And there are interface quirks: when you click in a track's check box to enable it, for example, you can't see the check mark in the box until you select a different track.

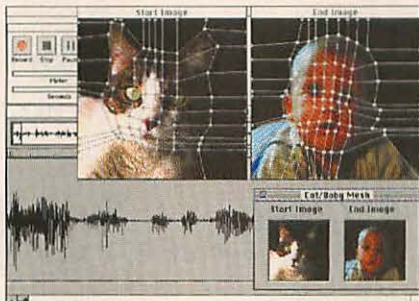
QuickMorph 1.1 is a fun little morphing utility, although it also tends to go south now and then. Creating a morph is a cinch: open two images, and then drag control points to indicate the corresponding points on each image. A dialog box lets you specify the length of the final sequence. The resulting morphs are adequate for the morphing tinkerer.

MotionPaint 1.1 lets you create animations and paint on QuickTime movies. MotionPaint sports the same tools as in color paint programs, including an airbrush, a magic wand, and an eyedropper. MotionPaint lets you paint individual frames of movies. You can specify that the

previous frame appear superimposed, but dimmed, over the current frame; this makes it easier to correctly position items in the current frame. MotionPaint can also import and export PICS files.

SoundMate 1.1 is a basic sound-editing utility that lets you record, play, and edit 8-bit or 16-bit, mono or stereo sounds at sampling rates of up to 44.1kHz. You can save recordings as QuickTime movies, System 7 sound files, audio interchange (AIFF) files, Windows-format WAV files, and sound resources. SoundMate also lets you add echo, play a sound backward, amplify a recording, and create a fade-out. It doesn't provide as complete an array of effects as Macromedia's SoundEdit 16, though.

As do many of its companion programs, SoundMate has quirks. Change a



**Multimedia Utilities** Two members of the Multimedia Utilities team: QuickMorph (note the grid mesh indicating which parts of the images correspond) and SoundMate (visible in the background).

sound's sampling rate, and the time-line rulers become inaccurate. Worse, if you choose Undo after deleting part of a stereo sound track, the program doesn't restore everything you deleted.

MovieClick 1.1 lets you add hot spots to QuickTime movies, which when clicked play other movies, sounds, or pause for a specified time. You can also specify transitions, such as wipes, when one movie switches to another. The result is an interactive movie. Unfortunately, MovieClick crashes regularly.

## The Last Word

So why does Multimedia Utilities rate three stars? The CameraMan screen recorder is an excellent tool—solid and fully featured. And each of the remaining five programs serves its intended purpose, provided you save often. If you don't mind a skimpy manual and some bugs, give Multimedia Utilities a try. And look to the future: Motion Works is aware of the problems in version 1.1, and plans an update that will fix them.—JIM HEID

# ProTerm Mac 1.0

## Telecom Software

**PROS:** Fast, reliable, stable performance; excellent manual. **CONS:** Lacks built-in help and AppleScript support. **COMPANY:** Intrec Software (602/992-5515). **LIST PRICE:** \$129.95.

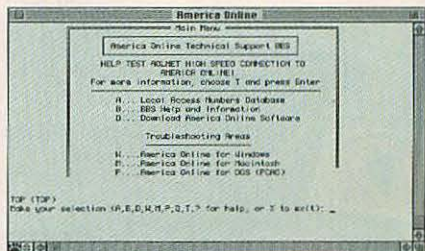


**P**ROTERM FROM INTREC SOFTWARE is a Macintosh version of a program that has long been available for the Apple II. Although on the surface it looks like just another no-frills communications program, it offers a level of sophistication that belies its small size and relative ease of use.

The entire package—application and support files, including drivers for most popular modems—fits on a single 800K disk. You copy the application folder to your hard drive and start the program. There is no installer application and no need to restart the Mac.

ProTerm offers a standard mix of telecommunications features. It supports the most commonly used file-transfer protocols, including Xmodem, Ymodem, Zmodem, and Kermit. There are a number of terminal emulations to make your connections compatible with all types of services, including the standard TTY and some more-obscure services, such as PSE/A2 and TeleVideo 910. An integrated text editor allows you to compose messages offline to avoid high connect and online expenses. You can also use the editing window to export text captured during your telecommunications sessions for use in a word processing or desktop publishing program.

Creating macros in ProTerm can be as simple or as complex as you like. As with MicroPhone Pro from Software Ventures and White Knight from Free-Soft, you can have ProTerm record your BBS log-on steps and other procedures by using its AutoLearn feature. If you require more-sophisticated scripting per-



**Keeping It Basic** A simple terminal window shows the progress of your online sessions.



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formance, you can use ProTerm's DIRC macro-programming language to build macros from scratch and to automate very complex telecommunications routines, which you can then recall with simple keystrokes.

If you're new to the sometimes confusing world of telecommunications, you'll want to study the manual thoroughly before diving into the program. There's no built-in help, and some of the menu commands may be a bit confusing for beginners. But the manual is especially deserving of praise. It's written more like a textbook than a typical software manual. Arcane telecommunications terms are explained in simple language, and the authors carefully guide you through the simple steps of setting up the software and connecting to a BBS, and then they take you with great dexterity through the maze of download protocols, terminal emulations, and finally, scripting.

Buying version 1.0 of a software package can be risky, but ProTerm has a level of sophistication and robustness you don't find in a typical initial release. And in terms of performance there's little to criticize. Connections to your favorite BBS or online service are quick and true. The AutoLearn feature works reliably for routine name and password entries without need of editing. The program runs stably and predictably in all respects. Although not native for the Power Macintosh, ProTerm was a brisk performer on my 8100/80.

One particularly useful feature is ProTerm's Connect List, which allows you to build a list of the services you regularly visit, and then have the program connect to them, one right after the other, automatically calling up one service as soon as you log off the previous service. The program can also create an activity log, so you can see just which service was contacted and when.

If there is anything to criticize in ProTerm, it's that it paves no new ground in running your communications sessions. It is a text-based program for accessing text-based services, with no fancy icons or pretty front end to ease navigation through such services.

### The Last Word

Despite the program's lack of truly innovative features, I was pleased with ProTerm Mac. Whether your telecommunications needs involve simply logging on to online services and various BBSs or you have sophisticated, complex scripting requirements in mind, you should definitely consider ProTerm for handling your communications chores.

—GENE STEINBERG

## CD Accelerators

### Utilities

#### CD Directory 1.0

**PROS:** Permits renaming and reorganizing catalog contents; catalogs are network-shareable. **CONS:** Cataloged CDs treated as local drives, slowing Finder searches. **COMPANY:** Insignia Solutions (415/694-7600). **LIST PRICE:** \$69.95.



#### RapidCD 1.04

**PROS:** Configurable optimization settings; supports multiple CD-ROM drives; audio autoplay feature. **CONS:** Can't control disk drive used for caching; can't add to predefined settings; not compatible with AppleCD Audio Player. **COMPANY:** Insignia Solutions (415/694-7600). **LIST PRICE:** \$69.95.



**R**APIDCD AND CD DIRECTORY, A PAIR of utilities from Insignia Solutions, improve CD-ROM performance and usability. RapidCD provides both RAM and disk caching of CD data, speeding access to frequently used data. CD Directory stores catalogs of CD directories on your hard drive, letting you access those directories at hard drive speeds. Both products include well-written, indexed user's guides.

RapidCD replaces your existing CD Driver extension. It lets you configure RAM and disk caches ranging from 128K to 4MB. If you have multiple CD-ROM drives, RapidCD lets you configure independent caches for each. While some other CD cache utilities restrict cache sizes to under 1MB, RapidCD's 4MB cache capacity takes advantage of the larger configurations of newer Macs. The dual RAM-and-disk cache arrangement means that cache contents persist across system restarts, improving the likelihood of cache hits, and thus overall performance. In tests of CDs ranging from clip-art collections to multimedia presentations, RapidCD lived up to its name.

RapidCD's control panel also lets you select from four kinds of cache optimization: General, Finder, QuickTime, and Database. They control how cache activity is divided between the RAM and disk caches. Unfortunately, you're limited to the selections provided.

RapidCD's control panel also includes an audio CD player. It works well but lacks the features found in Apple's

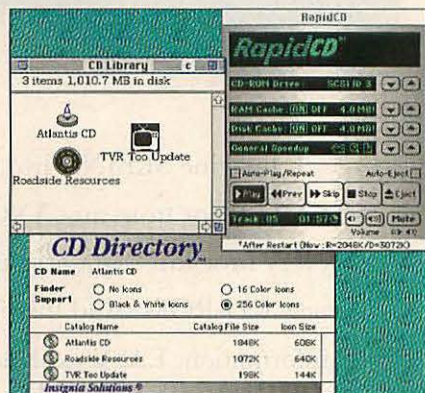
AudioCD utility. Unfortunately, RapidCD is incompatible with AudioCD.

CD Directory automatically catalogs CDs when you insert them, storing the catalogs on your hard drive. You then access the catalogs through a desktop icon named CD Library. You can rename items in a catalog and reorganize them—CD Directory will still find the original items. The CD Library looks like a disk volume, so you can share it on a network.

You can access the directories from within any Mac application, including directory-search utilities like System 7.5's Find File. However, such utilities can't distinguish the directories from mounted volumes. Thus a global search of local drives will include the CD catalogs, greatly increasing search time.

CD Directory catalogs CDs on insertion, a process that takes from a minute or two to nearly an hour, depending on the speed of your CD drive and the number of items on the disc. CD Directory's control panel lets you control the catalog-building process, setting it to off, automatic, or automatic with user confirmation. You can also reduce the ultimate catalog size and cataloging time by capturing fewer icon colors or no icons at all. An edit window displays the size of each catalog on your hard drive.

Although CD Directory works well with most CDs, some discs have formatting peculiarities that cause the catalog-building process to fail. According to



**CD Speed** RapidCD and CD Directory speed up CD-ROM access by caching data and directories.

Insignia Solutions, these problems are the result of damaged or inconsistent directories on the CDs themselves.

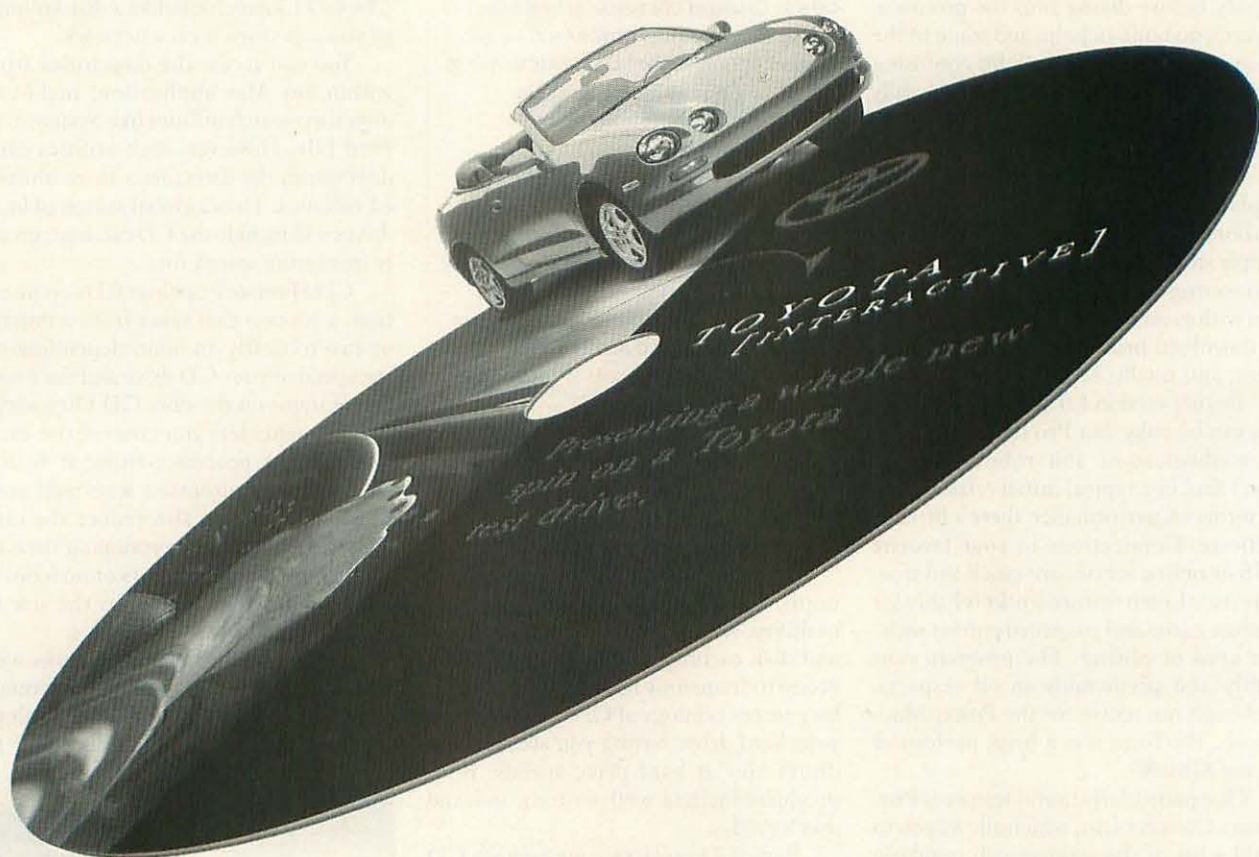
### The Last Word

Both RapidCD and CD Directory do their jobs well, and even help each other out when used together. In particular, CD Directory's elegant, transparent interface makes it a valuable tool for Macintosh users working with lots of CDs.

—MEL BECKMAN



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# OptiMem RAM Charger 2.0.1

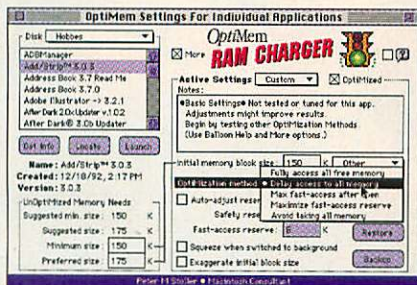
## Memory-Management Utility

**PROS:** Makes the Mac manage memory more efficiently; good interface and documentation.  
**CONS:** Requires tweaking for maximum benefit; default settings occasionally lead to instability.  
**COMPANY:** Jump Development Group (412/681-2692). **LIST PRICE:** \$129.



**O**PTIMEM RAM CHARGER 2.0.1 MAKES your Mac use memory more efficiently, and in so doing lets you use your Mac more efficiently.

Normally, a Mac application occupies as much RAM as is specified in its Get Info window. It reserves RAM in a block, neither releasing unneeded RAM nor taking additional RAM. If you launch two programs and then quit the first, you have more free RAM, but it's in two noncontiguous pieces. With 8MB total RAM free but in separate 4MB blocks, you can't



**OptiMem Options** A wealth of parameters allows you to tailor OptiMem RAM Charger's performance to the quirks of individual applications.

open an application that needs 6MB of RAM. And you may not know you're low on RAM until you run out.

OptiMem RAM Charger changes all that. It opens applications in smaller blocks of RAM. An application that needs more RAM can take RAM from any free block, then release that RAM when it's no longer needed. OptiMem can relocate blocks of occupied RAM to avoid fragmenting free RAM, so you can launch larger applications without quitting open ones. Finally, if RAM does run low, a traffic light over the Apple menu warns you.

## Managing Your Memory

To use OptiMem, you can just run the Installer and restart. But to make the most of it, you should take control. The OptiMem's control panel reports on total available RAM, the largest free block, and details of what you've saved and what's in use. From there, a button-click takes

you to the OptiMem Settings application, where you can enable or disable OptiMization for any application, then fine-tune the settings for each one with an impressive array of options—all detailed in the concise and witty manual.

You can also have OptiMem automatically OptiMize programs new to it and notify you when it does; select modifier keys that toggle OptiMization of applications on launch; and set the threshold for the low-memory warning.

OptiMem RAM Charger comes pre-configured to run many popular applications efficiently, and its defaults work fine with most applications it doesn't know. Still, it takes experimentation to make new programs work optimally with OptiMem. Fine-tuning my settings let me save several more megabytes of RAM, with no discernible loss in performance.

## Charging Ahead

To test OptiMem, I loaded application upon application, and my Mac just kept on ticking. When I pushed the limits, OptiMem warned me, and when I hit those limits, it told me which program to quit so another could launch or a running one could get the RAM it needed.

Ordinarily, taxing the Mac's memory this way might lead to unexpected quitting, but OptiMem can, as advertised, make your system more stable. I had a few crashes and slowdowns from programs that didn't like the factory settings. I fixed this easily enough, but until I did, I was trading old problems for new. Of the dozens of programs I tested, only one refused to run OptiMized: Symantec's MacTools Pro. Once excluded, it ran flawlessly alongside OptiMized programs.

The 64K question is, How does OptiMem compare with Connectix's RAM Doubler? Trick question. Because the two work in different ways, they don't compare directly. Moreover, they make a great team; with both installed, my 16MB of RAM looked like 32MB and worked more like 64MB. Unlike RAM Doubler, OptiMem works on every Mac back to the Mac Plus. It requires System 7, but it helps make System 7 practical for Macs limited to 4MB of RAM.

## The Last Word

OptiMem was already neat when it had fewer features yet was clunkier to use. OptiMem RAM Charger makes a good idea great, and at a \$50 street price it's a bargain. The Mac OS ought to work this way already. Until it does, there's OptiMem RAM Charger.—PETER M STOLLER

# MacAlly

## ADB Mouse

**PROS:** Inexpensive; same shape as Apple mouse; glides easily. **CONS:** Annoying warranty-registration requirement. **COMPANY:** The Mace Group (213/780-6110). **LIST PRICE:** \$49.



**A**S COMPUTERS COME CLOSER AND closer to becoming commodity items the way toasters and VCRs have, so do input devices. Macintosh users looking for a new mouse or trackball now have a wide variety of vendors to choose from. The MacAlly mouse is one that does the job without standing out from the crowd.

The MacAlly mouse looks like the Apple ADB mouse, with its rounded contour and single large button. Its button provides the same degree of auditory and tactile feedback as Apple's. Plastic feet on the MacAlly mouse make it glide even a bit more smoothly than the Apple mouse. Subjected to normal day-to-day use, however, the MacAlly mouse was indistinguishable from the Apple ADB mouse.

Underneath, a plastic cover twists off when you need to clean the ball and rollers. I tried disassembling the MacAlly to check its internal construction, but the housing wouldn't pry apart even after I removed both visible screws. Overall, though, the mouse seems adequately durable, and it stood up well to rough treatment over several weeks of testing.



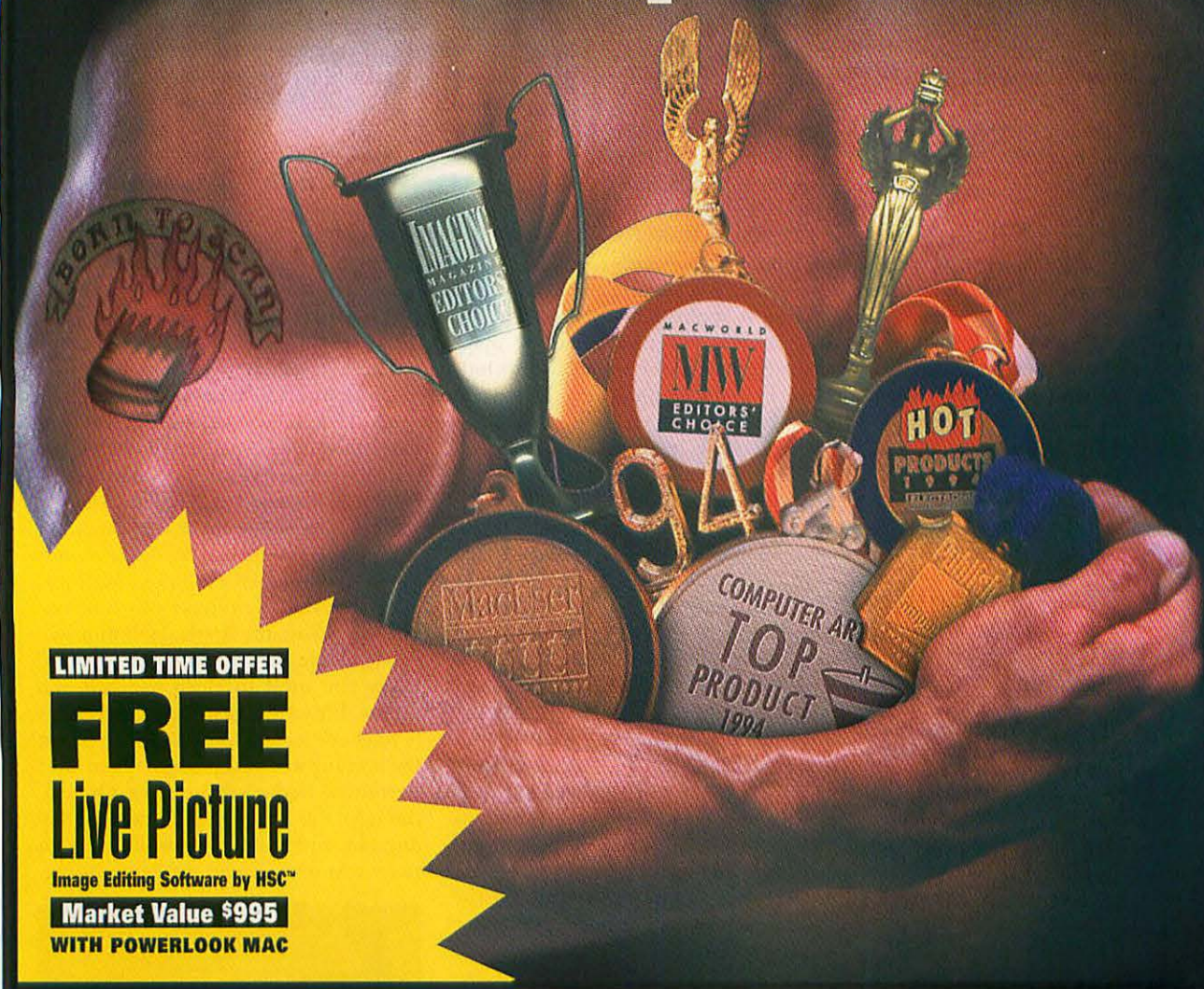
The documentation says that the 12-month warranty is invalid unless you send in the registration form (a requirement that may not be valid in some states).

## The Last Word

If you can spend about \$50 more, Kensington Microware's programmable Thinking Mouse is worth considering (see *Reviews*, *Macworld*, May 1995). But the MacAlly mouse does a competent job at an unbeatable price.—FRANKLIN TESSLER



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Circle 196 on reader service card



# GlidePoint

## Input Device

**PROS:** Uses very little desk space; can be used in any orientation; requires less arm movement than other input devices. **CONS:** Dragging is more awkward than with a mouse. **COMPANY:** Alps Electric (408/432-6000). **LIST PRICE:** \$99.



FOR COMPUTER USERS WHO ARE IN pain every time they use a mouse, the ideal pointing device would require no arm motion at all. While that's not yet practical for most people, the Alps GlidePoint lets you control the cursor with a minimum of effort, using the same technology as the Trackpad built into Apple's 500-series PowerBooks. (For a look at another Macintosh touchpad, MicroQue's QuePoint, see *Reviews, Macworld*, May 1995.)

At 3 by 3 inches, the GlidePoint is compact, and it actually requires less work space than a mouse. It comes with an ADB cable and extension cord that stretch over 6 feet, and the device is compatible with desktop Macs and PowerBooks. Four rubberized feet on the bottom prevent the GlidePoint from sliding around during use. Aside from

its three buttons, the GlidePoint contains no moving parts, and the pad is sealed to protect it against dirt and moisture.

The GlidePoint is as intuitive as any pointing device can be: you simply move your finger in whatever direction you want the cursor to go. Unlike most drawing tablets, where every position on the tablet corresponds to an absolute screen location, the GlidePoint uses relative positioning: if you lift your finger and move it to another spot, the cursor stays put. (The manual recommends that you use your index finger to point. The GlidePoint senses the interaction between your skin and a weak electrical field, so you can't use a pen, pencil, or fingernail instead of your finger.)

It takes some practice to learn to control the GlidePoint's cursor precisely. Fortunately, you can adjust the device's sensitivity using a supplied control panel. The control panel lets you specify the GlidePoint's orientation in 90-degree increments, so you can use it with the tablet facing any direction (the software automatically compensates for the position of the buttons). You click or double-click by tapping the GlidePoint lightly once or twice. To drag the cursor, you tap twice and then slide your finger without removing it from the pad; unfortunately, the GlidePoint's surface is small and your finger reaches the edge of the tablet before you've



KEVIN CANDLELAND

completed a dragging operation, forcing you to start over. You can program any of the GlidePoint's three buttons to click up to three times or drag-lock when pressed. (You can also program the buttons to activate simple keyboard shortcuts like cut and paste.) I found it difficult to activate the buttons without lifting my index finger from the pad, however.

**The Last Word** Although I still prefer using a mouse, the GlidePoint is an attractive, cost-effective alternative for people who can't tolerate a conventional pointing device. It's also worth looking into if you're really short on desk space. As with all input devices, though, remember to audition the GlidePoint thoroughly before you buy it.—FRANKLIN TESSLER

# FolderBolt Pro 1.0.3

## Security Software

**PROS:** Top-notch encryption schemes; flexible access controls. **CONS:** Access controls require some low-level directory manipulation. **COMPANY:** Kent Marsh (713/522-5625). **LIST PRICE:** \$129.95.

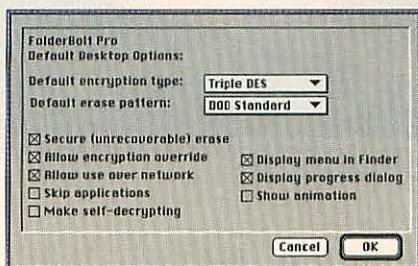


FOLDERBOLT PRO LETS YOU secure data on your Mac by "bolting" folders via password protection and encrypting the enclosed data. Bolting folders requires some rearranging of the disk directories that the Mac uses to display files and folders. While such low-level rummaging around in your system sounds complicated and potentially hazardous, it's really not.

FolderBolt Pro's interface is simple and straightforward. You secure folders from the desktop, using a pull-down menu in the Finder's menu bar. A dialog box asks you for a password and then offers four ways to secure the folder: Bolt, Deadbolt, Read-Only, or Drop Folder. Bolt restricts a folder's access to users who know the password. Deadbolt both locks the folder and encrypts

the enclosed files. Read-Only allows users to view the contents of a folder but doesn't let them make any changes. Drop Folder lets users save to a folder but doesn't let them view or change files inside.

Think of the bolting features as a fairly strong deterrent, not as complete protection for your files. Both System 7.5's Recent Documents feature and Now Software's SuperBoomerang can open unencrypted documents inside bolted folders. And a professional data thief or an experienced Macintosh user who really wants access to your data can bypass the bolting protection with a low-level disk editor, although doing so requires time and effort.



**Lock, Stock, and Folder** You can customize FolderBolt Pro's security features by varying your preferences in this dialog box.

For additional data security, you'll want to use FolderBolt Pro's encryption features.

FolderBolt Pro lets you encrypt files individually or as part of the bolting process. It even lets you create password-protected, self-decrypting files for sharing with users who don't have the application. The five encryption modules range from the company's proprietary schemes, which shield your files from casual snooping, to the supersecure triple DES national standard, which keeps even the FBI's best code breakers out of your business. It takes longer to encrypt and decrypt your data using triple DES (2½ minutes on a Quadra 700 for a 230K word processing file, or 20 seconds for the same file on a Power Mac 6100/66), but that's a small price to pay for security.

For emergency access (such as when you've lost your passwords), FolderBolt Pro includes a master-key application that overrides all security on files locked with the same copy of FolderBolt Pro. The master-key application also keeps logs, sets preferences, and lets administrators customize the security features on their networks.

**The Last Word** Easy-to-use FolderBolt Pro provides solid protection for sensitive files. Given the state of computer security these days, we should all be locking our digital doors a lot more than we used to. FolderBolt Pro is a worthy addition to your computer keychain.—MATTHEW HAWN

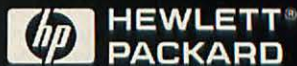


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# FullPixelSearch 1.5

## Image-Analysis Software

**PROS:** Unique; easy to use; fast. **CONS:** Slender documentation; some needed features yet to come. **COMPANY:** Avian Systems (201/224-2025). **LIST PRICE:** \$1295.



IN MOST MACINTOSH IMAGING, A picture is just a picture. But in scientific imaging, the picture often represents a set of numbers. This calls for a different kind of image program. FullPixelSearch 1.5 is an especially useful product in this image/numbers-analysis field.

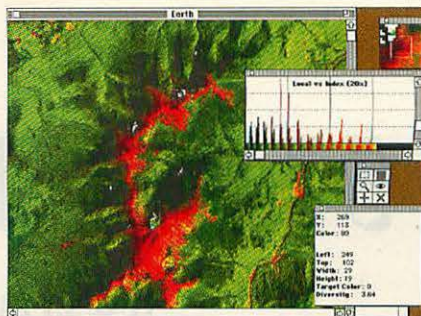
Scientific images are usually constructed in so-called false color: a palette of 8-bit indexed colors represents a range of numbers scaled from 0 to 255. A digitized X ray might show a set of colors scaled to represent density numbers, an image of a flame might show colors corresponding to a range of temperatures, and a satellite image might display colors that index ground-microwave reflectivity. Sometimes the picture itself displays the useful information (an X ray showing a tumor, a satellite image suggesting oil deposits), but typically, fur-

ther analysis is needed to extract results.

FullPixelSearch lets you do this kind of analysis. With a small palette of tools, it can analyze images 1 pixel at a time, in 8-by-8-pixel blocks, in arbitrarily sized blocks smaller than 8 by 8 pixels, or in image-wide format. For example, if you place the Eye tool over a single pixel, all pixels with the same color palette index value light up in FullPixelSearch's highlighting color (which can even blink to make pixels easier to spot).

The main reason to use FullPixelSearch, however, is to generate pixel-statistic reports with the Search function. Using a variety of pixel-selection functions (the rectangular marquee is most useful), you pick out a group of pixels as a match set. The program then scans the whole image, pixel by pixel, and prepares a text report showing how many pixels' index values fall within the match set. For a researcher looking for possible tiny tumors in a magnetic resonance imaging scan or seeking dwarf stars in a large expanse of night sky, FullPixelSearch is well worth its rather steep price.

The slim documentation assumes user familiarity with scientific-image conventions and palette editors such as NCSA's PalEdit, but that's a reasonable assumption



**The Blink of an Eye** Choosing the Eye icon in FullPixelSearch highlights all the pixels whose index color matches the color of the pixels in the selection rectangle.

for the program's main audience of professional scientists. The next step up in utility for FullPixelSearch is batch processing of images and consolidated reporting, promised for version 1.75 in summer 1995.

**The Last Word** FullPixelSearch still needs a few more features: batch processing, scripting, and the ability to handle 12-bit and 16-bit images would greatly extend its power. But in its domain of pixel statistics it's the only game in town. Upgrades (including a Power Mac version, batch processing, and an Adobe Photoshop plug-in) are free for a year, and version 1.5 as it stands is a remarkable tool for its particular functions.—CHARLES SEITER

# YST-SS1010

## Speaker System

**PROS:** Clean, reasonably accurate, undistorted sound; extra input jacks for external CD-ROM player. **CONS:** Poor manual. **COMPANY:** Yamaha Corporation of America (714/522-9240). **LIST PRICE:** \$349.95.



TYPICAL SMALL MULTIMEDIA LOUD-speakers are seldom capable of good, low bass. Yamaha's YST-SS1010 speaker system is designed to address this problem.

The Yamaha system consists of two magnetically shielded satellite speakers and a subwoofer module. The amplifier and controls reside on the bottom front of the right speaker. In addition to power and volume controls, there's a presence (treble) control for adjusting high frequencies. The subwoofer module has a high/low cutoff switch (which determines the frequency at which the subwoofer takes over), an on/off switch, and a level control. There's a separate set of inputs on the subwoofer for a CD player or other sound source.

The system plays at reasonably loud levels without undue distortion. The satel-

lites output 10 watts per channel, and the subwoofer, 25w. (Since Yamaha doesn't tell which rating technique it uses, there's no way to compare these figures with those of other products.) The subwoofer is supposed to reproduce 35Hz; Yamaha credits its active-servo technology for this level of performance. This technique combines a rounded port (basically a long hollow tube) and a separate negative-impedance amplifier to enhance low-level reproduction.

The biggest failing of this product is the difficulty of getting the system to sound its best. Placement of the satellite speakers is straightforward; they can fit on either side of your Mac or in a similarly convenient location. But where do you put the subwoofer? The all-too-brief instruction booklet provides no hints, nor a suggested subwoofer volume level, nor the proper cutoff-switch setting. Another problem is that the level controls for the satellites and the subwoofer are separate. When you adjust the volume on one, you have to make a corresponding adjustment on the other.

After you've installed it, you'll be pleased with the Yamaha system. In general, I found the sound to be warm and smooth. Bass reproduction was solid and clean. Although the unit doesn't quite have enough power to fill a large room with undistorted sound, it's fine for a typical home office. I compared the system with the



Audio-Technica MMS557 speaker system. While the Yamaha's subwoofer provides superior bass extension, the Audio-Technica speakers have a somewhat brighter, crisper sound. You'd be hard-pressed to choose which is better.

**The Last Word** Once you get the Yamaha multimedia system set up correctly, the performance is definitely above average for satellite-and-subwoofer systems in general, and very good for a computer speaker. This is a product I can highly recommend.—GENE STEINBERG

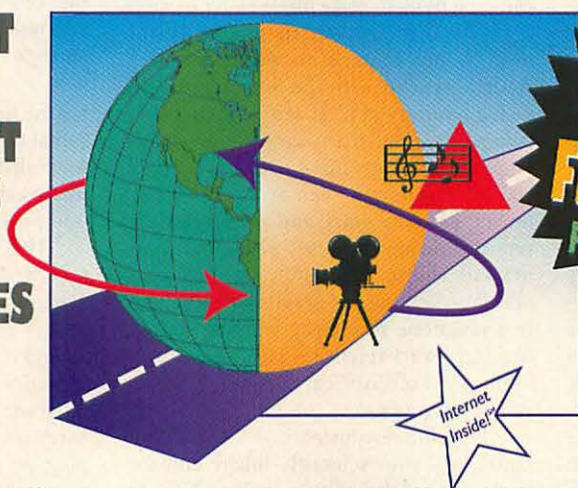




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# Alien Skin Textureshop 1.0

## Texture Generator

**PROS:** Creates a wide variety of seamless-tile patterns; textures can be used as Photoshop filters.  
**CONS:** Little control over textures' appearance.  
**COMPANY:** Virtus (919/467-9700). **LIST PRICE:** \$99.



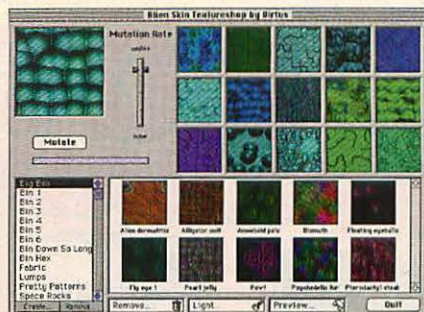
HERE I AM, SITTING AT MY MAC, applying oodles of mutations to Big Orange Bumps. An odd task, to be sure, but it's all in a day's work for a *Macworld* reviewer. I'm looking at Alien Skin Textureshop (AST), a program that generates patterns that designers can use as backgrounds, surface textures, or other graphic elements in printed or multimedia projects. The patterns that AST creates are seamless tiles, suitable for backgrounds of any size. Patterns can also be used as filters with image-editing programs such as Adobe Photoshop.

AST comes with dozens of prefab textures that run the gamut from wood and stone to reptilian scales to gelatinous goo. You choose a master texture, then adjust a slider to set the degree of "mutation," or changes applied to the original pattern. The

program generates 15 textures based on the master texture; you can save any of these you like, name them, and then apply further mutations if you wish. You can organize groups of textures into "bins," which you open from the program's main window.

Once you've created a promising mutation, you refine it by adjusting the color, direction, and reflectivity of light hitting the texture; since many of the textures look 3-D, with peaks and valleys, you can create interesting effects by experimenting with the lighting controls. You can also change a pattern's tile size to increase or decrease a texture's resolution. You may export AST patterns in PICT or CMYK TIFF format for printed documents, or PICT or RGB TIFF for multimedia projects.

Alien Skin Textureshop is easy to use, fun to play with, and a source of countless patterns. Certain personality types will enjoy AST; others may not. Control freaks should avoid it, since one is pretty much at the mercy of random mutations. (Specular International's TextureScape [413/253-3100, \$195] creates seamless tiles from imported PostScript images [see *Reviews*, *Macworld*, February 1995], but this added control has a price: TextureScape costs about twice as much as AST.) Likewise, lit-



**One Way to Skin an Alien** Depending on the mutation rate you select, Alien Skin Textureshop applies subtle or radical changes to a master texture, creating tiled patterns for graphics projects.

eralists looking for realistic natural textures would be better off buying a CD-ROM full of scanned textures, such as those from Artbeats (503/863-4429). So who will find AST useful? People who don't have the time, inclination, or artistic ability to create their own intricate and varied set of patterns.

**The Last Word** While Alien Skin Textureshop gives you little control over your creations, it does offer a graphics laboratory where experiments can mutate wildly, often producing visually interesting results. When it comes to making bizarre and beautiful patterns, there's something to be said for pressing a button and letting a program do the work.—ERFERT FENTON

# Select 1.6

## CMYK Color-Correction Plug-in

**PROS:** Selective-correction mode offers easy-to-understand color tools. **CONS:** Clumsy interface; poor documentation; overpriced. **COMPANY:** Human Software Company (408/741-5101). **LIST PRICE:** \$245.



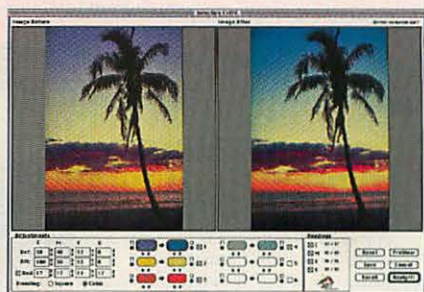
SELECT IS A PLUG-IN FILTER FOR working with CMYK image files from inside Adobe Photoshop and other image processors that support plug-ins. It enables you to make color corrections globally, within a selection, or within a specific color range. This is the kind of operation that color-prepress professionals and graphic artists frequently perform to tweak the amount of yellow in sky blue, say, or to switch a particular red to green.

Select provides two ways to access your color controls. In Gradation mode you control each channel—cyan, magenta, yellow, and black—by adjusting its graphed curve, similar to working with gamma-curve controls. This is handy for correcting color casts and compensating for variations in printing inks. In Selective mode you make

changes to a narrowly defined color range—the light-to-medium blues in water reflections and the sky, for instance—that may include combinations of the CMYK colors. Selective mode is good for making dramatic changes to colors that can be easily separated from other colors around them; you might use it to alter a model's eye or lip color, for example.

In Gradation mode you can edit each color channel separately or uniformly change selected channels. Each curve has five control points, which you edit numerically or move along the graph to increase or decrease the color in a particular tonal range. You can introduce additional control points, but you can't, oddly, edit them numerically. The graphs for all four color channels are squeezed into a single screen alongside preview thumbnails. This arrangement results in small curves that are hard to grab and move subtly.

Selective mode is more intuitive than its counterpart in Photoshop, the Replace Color command. It's similar to specifying print colors in percentages of the CMYK colors. Using the eyedropper tool, you first select a "before" color. You can move the before color to the "after" area and either adjust it or select a new after color from the image, or you can define the new color numerically. When you click on the Apply button, Select adjusts all before colors in



**Palette Tune-up** In Selective mode, you can change up to six colors at once in familiar CMYK percentages.

the image within a specified radius or range of that color to match their after colors. You can correct up to six colors at once.

You can vary the effect on an individual channel by changing its radius setting, but the procedure is a bit confusing because you have no feedback except the small preview. An additional drawback is Select's lack of a clipping alarm to warn you of pixels that might be compromised by changes. Losing color data can produce noticeable shade stepping in what began as a subtle blend.

**The Last Word** Although its Selective mode provides a convenient and intuitive way to make changes to several colors at once, all of Select's features have equivalents in Photoshop that for the most part are easier to use.—MATTHEW C. NIELSEN



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# The New Mac OS

## Unveiled

by Galen Gruman A fundamental reworking

of the Mac system software is in the works—Macworld reveals  
how this will make the Mac even better

It will do more. It should crash less and use less RAM. It will automate more tasks and reduce desktop clutter. "It" is the next generation of the Macintosh Operating System, a major reworking of the Mac OS. Due in mid to late 1996, this as-yet-unnamed successor to System 7.5, code-named Copland,

promises to boost productivity by making the Mac OS operate more efficiently, by building automation into common tasks, by incorporating many features that Apple has previously offered only as options, and by providing greater flexibility and control over managing your work. Copland will also give the Mac a jazzier look (see the companion article, "The Mac's Jazzy New Face").

You may be expecting Copland to deliver a radically new way to interact with your computer—after all, Windows 95 will bring radical changes to PC users—but Apple is doing something more important: making the Mac OS more stable and more flexible in ways that you'll appreciate after you've used it awhile. You'll start to notice that you get fewer error messages, you'll get accustomed to starting several tasks running at the same time, and you'll expect programs to run faster. If Apple delivers as promised, the Mac OS will be not merely a much better OS for Macintosh owners, but a strong competitor to Windows 95 and OS/2 (see the sidebar, "Can Copland Compete?").

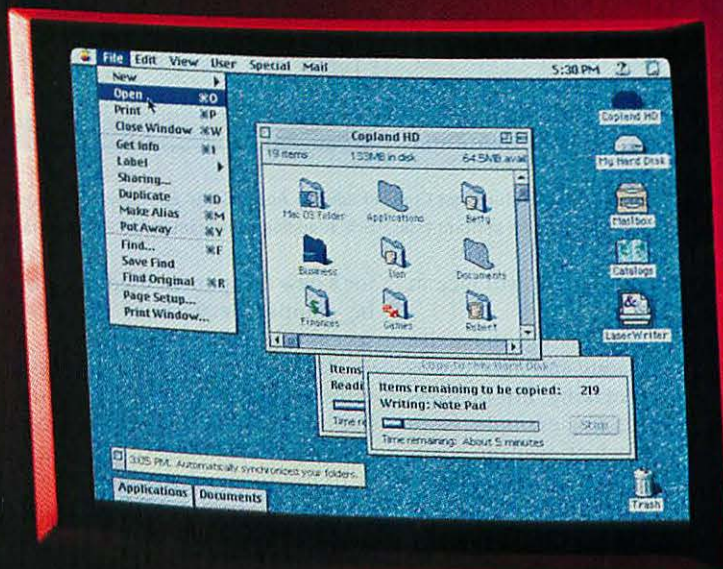
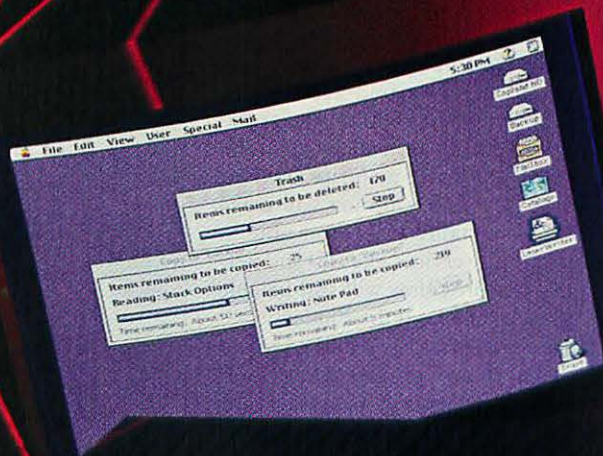
### REBUILDING THE GUTS

Among the major changes that Apple has in store are a series of technologies with intimidating names: preemptive multitasking, protected memory, hardware abstraction layers, demand-paged memory, and multithreading. These technologies will let the Mac work more smoothly while executing multiple tasks simultaneously; better handle graphics, video, sound, and animation; recover more easily from crashes and driver conflicts; and get by on fewer resources than today's piggy System 7.5 uses. Copland will also eliminate some important constraints that hold back today's Mac.

### Managing Resources for Reliability

Every Mac owner has been hit with the dreaded "Application Unexpectedly Quit" dialog box or, worse, sudden system lockups and crashes. The usual cause is contention over memory and CPU cycles. Under the cooperative multitasking of the current OS, the Finder and programs are supposed not to get in one another's way. (In an application's Get Info box you can set how much memory the application reserves for itself; demand for CPU cycles is invisible to users, but it's something programmers must decide when they develop applications.) In practice, programs—including OS components like PrintMonitor—often don't cooperate, stealing memory and CPU cycles from one another, and sometimes causing a lockup or crash. Copland introduces three solutions for this problem.







**Preemptive Multitasking** First is preemptive multitasking, in which the Mac OS automatically switches between active tasks at fixed intervals to ensure that time-sensitive operations (such as communications or file I/O) get enough time. (Today's OS relies on each application to surrender access to CPU time, file services, ports, and other system resources.) Preemption isolates each program so it can't cause trouble for others. But Copland implements preemptive multitasking only for network services, file services, and threads—miniprograms that a program or the Finder might generate to execute a task, such as a find-and-replace command or a print routine. Programs and the Finder must still share resources cooperatively for the majority of their functions. Partial preemption will make the Mac more stable and better able to handle multiple services like I/O and networking—but programs will still be able to crash each other and the Finder.

**Memory Protection** Copland's second fundamental change to increase reliability is memory protection, in which each application is allowed to modify only the memory assigned to it. Under the current Macintosh OS, tasks stick to their own area in memory only while on good behavior—so when one application stumbles, it can trip up data in other applications' memory and even data in the Mac OS itself.

**Divide and Control** Copland's third set of solutions—the programming version of divide and conquer—will prepare the Mac for the wide variety of hardware and

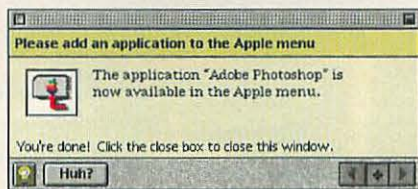
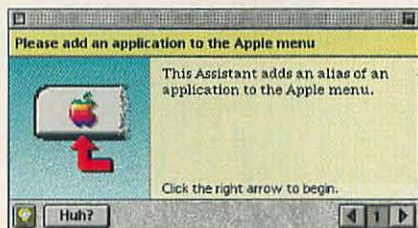
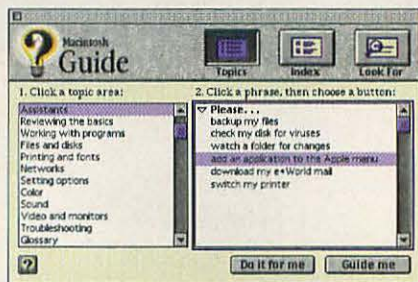
**Help Me Along** The Assistants feature that Copland adds to Apple Guide goes beyond walking users through a task and begins to help users perform tasks, such as adding a program to the Apple menu.

motherboard components it will face in the age of clones.

Copland will use isolation and active management to separate and tightly control components, making interactions predictable and safe. For example, Copland's file services (which manage creating, naming, moving, deleting, aliasing, linking, and copying files) will be separate from the rest of the OS, as will networking services and I/O services.

Under Copland, the part of the OS that manages the Finder and applications, called the microkernel, can crash without affecting a network transaction or data coming in from a scanner. You'll just restart the Finder without rebooting the Mac, and continue working.

Copland will also use a hardware abstraction layer, or HAL, to separate drivers and extensions from the microkernel, so that a havoc-wreaking extension will simply not load, and the driver



for a new component used in a clone will be compatible without the OS being specifically designed for it.

But Apple's adoption of a HAL prevents developers from directly controlling hardware to fine-tune the performance of some components. With a HAL, Apple is trying to avoid the incompatibilities that put PC owners through contortions when the PC clone market exploded.

Apple engineers caution that no system will prevent all crashes—even under Copland, a buggy or damaged extension could affect several components of the Mac OS and cause a systemwide crash. The goal is to reasonably ensure system stability, a kind way to characterize the current Mac OS's instability.

#### Managing Resources for Efficiency

In addition to new reliability techniques, Copland will offer new capabilities intended to squeeze the most from what-

ever resources your Mac has available.

**Demand-Paged Memory** The use of RAM has gotten out of hand—with 24MB of RAM installed, you can still max out your memory running Adobe Photoshop, Microsoft Excel, or another big program under the full System 7.5 on a Power Mac. At fault is Apple's memory scheme, in which programs and the Mac OS reserve fixed, usually huge, chunks of memory to load all their features. Apple is changing the memory-allocation scheme in Copland so that programs load just what they need at the moment. When a program stops using a feature, that segment of code is *paged*, or moved, to virtual memory (a scratch space on disk), and then paged back to RAM when needed again. System 7.5's virtual memory scheme now does this with whole programs as you switch between them, but Copland will page pieces of programs, as well as pieces of the Mac OS.

Consider QuickDraw GX, which has three major functions—printing, graphics handling, and font handling—in addition to the standard QuickDraw screen display. If you install QuickDraw GX now, it takes up about 3MB in memory whether or not you use all of its capabilities. Copland will load the printing services just when you print and then page them to disk when you're done.

Apple says that this on-demand memory paging will let a user take advantage of all of Copland's services in the same amount of RAM it takes to load System 7.5 stripped of QuickDraw GX and PowerTalk; performance on the two systems would be the same. Similarly, Excel, Photoshop, PageMaker, QuarkXPress, and other big applications should run at a decent clip on 8MB and 16MB Macs, even with multiple programs running on a system stuffed full of third-party extensions and fonts. Of course, the more real RAM you have, the less paging and the better the performance.

Apple's paging scheme, where the feature in memory unused for the longest time is the first paged to disk, is not optimal for all programs—the overhead of loading and unloading occasionally used but large features might make the process slower than would leaving them in RAM and paging other features more frequently. Developers can replace Copland's paging scheme with schemes of their own, but since paging affects all programs, a scheme optimal for one program could hinder performance in others, and users may have to experiment.

**Multithreading** Having several tasks, or threads, operate concurrently in protected memory should make the Mac OS more efficient. Because threads can run



simultaneously and independently, you can fax and print at the same time, for example, even from the same program. This is one of the best features in OS/2 and Windows NT today.

Another example: multithreading can help QuickTime support larger windows and run faster. Today, QuickTime reads a batch of images from disk, processes

receives a request from a scanner to send 13MB of data to the Mac and then gets a request to move 1MB of data to a hard drive. System 7.5 processes the scanner operation first, even though it will take much longer than the hard drive operation. Under Copland, the Mac OS will give the shorter, or more immediately needed, task priority.

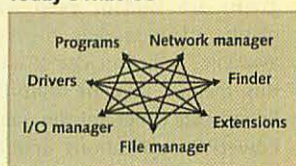
## How Copland Reduces System Crashes

Today's Mac OS puts all the components—drivers, extensions, the Finder, network and other managers, and of course programs—in one big memory space. But these components can conflict over resources and cause crashes. Copland will put almost every component in its own memory space (shown below as boxes) so they can't conflict over resources. The key exceptions are programs and the Finder, which will continue to share one

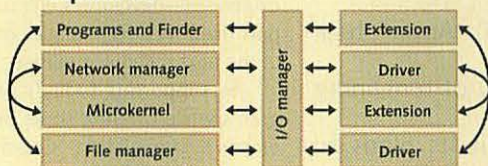
large memory space. Still, even if the Finder or a program crashes, the network, file, and other services should be unaffected.

Copland also uses an I/O manager to arbitrate communication (shown with arrows) between the system drivers and extensions and the OS components and programs. Today's Mac OS lets all these objects communicate directly, and these unmanaged communications can cause crashes.

Today's Mac OS



Copland OS



instructions on how to present the images, and then sends the images to the screen. QuickTime can't always read the next batch of image data fast enough, causing a pause in the video or audio. A multithreaded QuickTime would read the next images from disk while processing the current batch. Other applications will be able to take advantage of multithreading in similar ways.

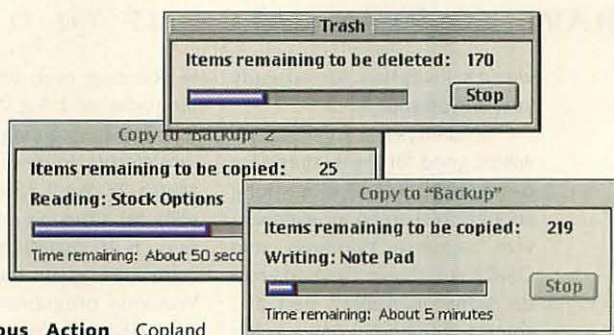
## Faster Core Components

Apple is also rewriting much of the Mac OS as native Power Mac code. The company has announced that its goal is to make Copland 95 percent native, although some Apple engineers privately told *Macworld* that 95 percent is probably too ambitious (see "Long Road to a Native OS," *Power Mac News*, *Macworld*, April 1995). Apple says the last parts of the OS slated for rewriting are those that handle 680X0 compatibility.

The key foci for native code under Copland are the I/O and file systems, two components of System 7.5 that work under emulation and are serious performance bottlenecks. Apple engineers say that they'll also squeeze more performance out of these areas by using better algorithms. For example, the new SCSI Manager will handle SCSI transfers in the most efficient order, instead of in the order it receives the transfer requests. Under System 7.5, if SCSI Manager first

## Massive Storage

Ten years ago, a 20MB hard drive awed most users with all that space, even if it did cost \$1600 or \$2000. Today, a 2GB drive—equal to a hundred 20MB drives—is commonplace and costs about \$1000. To accommodate network services, huge numbers of files (component software schemes like OpenDoc will greatly increase how many files you have), and disk-eating multimedia files, Apple is increasing the maximum drive-partition size to



**Simultaneous Action** Copland can perform multiple I/O tasks—such as copying one batch of files while deleting another batch—simultaneously and independently.

256 terabytes, or about 262 million megabytes. That should be enough to handle a few QuickTime VR movies, with space left for installation of Microsoft Office.

The number of files per drive, however, will remain limited to the number of blocks on the drive (a block can't hold more than one file) because that's an

inherent limit in the Mac's hierarchical file system (HFS). Apple recognizes that HFS won't suit everyone's needs, so Copland will allow the use of other file systems, such as Sun Microsystems' file service, which can handle an unlimited number of files (of course you will need drivers, like PC Exchange for the Mac, to read disks using other file systems).

## ASSERTING THE MAC'S ADVANTAGES

In addition to providing a better infrastructure for the Finder and Mac applications, Copland will integrate several Apple system services into the core OS.

## Display and Printing

QuickDraw GX's adoption under System 7.5 has lagged—developers can't count on most users installing the GX option because it requires so much RAM and is incompatible with many fax drivers and several common programs.

Under Copland, QuickDraw GX will be the only QuickDraw in town, so developers will have to support Apple's new imaging model. All current QuickDraw GX programs and most current non-GX programs will be compatible with Copland's QuickDraw GX, Apple says.

The recently released QuickDraw 3D is also being folded into Copland, giving developers a standard way to add 3-D capabilities to CAD, modeling, and other applications (see "The QuickDraw 3D Revolution," *News*, May 1995).

## Component Software

OpenDoc, the joint Apple/IBM/Novell project to let developers create small program modules that

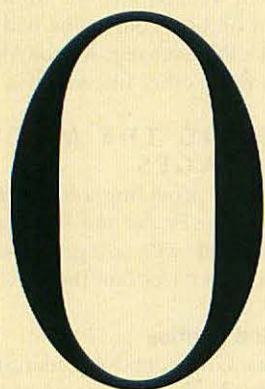
work together on user documents, will be a standard component in Copland; it will first ship as an option by early 1996, Apple says (see "OpenDoc and OLE 2.0," November 1994). Apple is also wholeheartedly adopting Windows' approach to DLLs (dynamic linked li-

braries), called shared library modules on the Mac. DLLs are software components that multiple programs can use—for example, a word processor and an E-mail package could use the same spelling checker—that have proven to be a hit among Windows developers (including Claris, Apple's software subsidiary).

But Apple hopes to improve on Microsoft's implementation of DLLs with an OS component called the Code



# Can Copland Compete?



Over the last year or so, Microsoft has been the focus of OS stargazers, as the software giant tantalized the computing world with talk of Windows 95 (see "The New Windows Threat," *Macworld*, February 1995). Apple stuck to its policy of remaining silent about its plans to counter Windows 95, until the Microsoft marketing juggernaut built up so much pressure that Apple had to reassure its customers and third-party developers. Thus Mac-

Still, with 18 months remaining until Copland ships, you'd think that developers could be ready in time. But developers need more time for two reasons.

First, most major Mac developers also develop for Windows, and now that their Power Mac ports are done, the developers are too busy with Windows 95. Copland rewrites will just have to wait until Windows 95 settles down. Second, most major developers revise their products independent of Microsoft's or Apple's exigencies—developers will support major new capabilities only at the next scheduled release.

By supporting today's programs while offering some preemptive capabilities, Copland bridges the gap between System 7.5 and Gershwin (a follow-on to Copland whose multitasking will be fully preemptive).

So it makes sense for Apple to phase in preemptive multitasking. But won't Microsoft's getting preemptive multitasking to market ahead of Apple blunt Apple's ability to sell its preemptive multitasking? Perhaps not, because the final beta of Windows 95 cannot preemptively multitask 32-bit-native programs effective-

present multimedia, calculate spreadsheets, and play games all at once.

Windows 95 users will be able to get around the preemptive problem by running current programs in shared memory in a cooperatively multitasking environment (the same technique that Windows 3.1 and System 7.5 use today). But in this scenario Windows 95 will run out of conventional memory (DOS's 640K limit), as does the current Windows when too many programs are loaded, even with plenty of extended memory available. To get an idea of what this means, imagine that the Power Mac could not run native PowerPC applications and instead forced users to run only 680X0 applications in emulation, and then only a few at a time. (Microsoft says Windows 95 isn't based on DOS, but developers say otherwise.)

As for OS/2 and Windows NT, their preemptive multitasking runs fine now, showing that this OS approach can work. Fortunately for Apple, OS/2 is difficult to install and use, and Windows NT runs standard Windows programs slowly.

## APPLE WILL HAVE TO PLAY CATCH-UP TO OS/2 AND WINDOWS 95

world's invitation for an early look at Copland.

It's pretty clear why Copland will be good for the existing Mac community, but will it be strong enough to succeed, or even survive, against Windows and OS/2? Yes, thanks to some smart decisions on Apple's part and some fundamental flaws in the competition's offerings.

### Mostly Multitasking

Why did Apple decide to make Copland only partially preemptively multitasking? Apple says that going to 100 percent preemptive multitasking, with its much-improved stability and much greater performance for some tasks, would require developers to produce major rewrites.

Running even one of these programs can bring Windows 95 to a crawl, according to tests by *InfoWorld* (published in its March 27, April 2, and April 24 editions). (The reason, Microsoft says, is to maintain backward compatibility with today's 16-bit Windows programs—a burden the 32-bit Mac does not bear.)

That such a serious problem exists only six months before Windows 95's ship date raises concerns about the program's fundamental stability, despite Microsoft's claims that it has a fix for the problem (*InfoWorld* also tested the fix and found it wanting). Support for 32-bit preemptive multitasking is the keystone in Microsoft's plan to make Windows able to work online,

In any case, multitasking desktop systems may never become as bulletproof as minicomputers and mainframes. Even with protected memory, desktop systems share so many resources—for example, when two applications overlap windows on a monitor or share a mouse—that the applications must be aware of each other.

### Driver Education

What about drivers? The new HAL architecture will require many vendors to rewrite their drivers and other extensions. But drivers are relatively easy to update, and the HAL architecture, in addition to providing greater stability by isolating drivers from everything else, gives



hardware designers a compelling reason to rewrite their drivers: clone support. As clone makers begin designing motherboards using components Apple never anticipated, and as the future Apple/IBM converged platform is adopted by companies that use their own components, writing for the HAL neatly skirts the risk of incompatibilities with new Macs: both clones and Apple's.

For example, a clone may not use the same floppy drive in its Macs as Apple or Radius. Under System 7.5, an application might expect to encounter an Apple floppy drive; if instead it finds a different drive—even with the right driver software installed—that application could lock up. Under Copland, the program will communicate with the Mac OS's I/O services, as will the device driver; in effect, the OS, through the HAL, will mediate interactions between strangers. The HAL will also ensure the

ware. With Copland, Apple is taking a push-me/pull-you approach. By turning previously exotic components into core elements in its base operating system, Apple will compel more developers to support technology they might otherwise not bother with—developers that play along can rest assured that their customers will be able to take advantage of all Apple-provided technology their products use.

Still, Apple is taking a big risk with this approach. Will enforced support of QuickDraw GX, PowerTalk, and other OS services deter developers from supporting the Mac? Will cross-platform developers then force Apple to produce Windows versions of these crown jewels? Or will developers be willing to exploit Apple's key capabilities in just the Mac versions of their products?

Microsoft and IBM are pushing similar technologies in Windows 95 and OS/2, so Apple

Apple Remote Access is better than Windows Remote Access; and OpenDoc, when it ships, will be better than OLE. Apple understands this advantage and is working now on making all three features cross-platform.

By the same token, some Apple technologies—QuickDraw 3D, QuickDraw GX, and WorldScript—are key differentiators. If you want those capabilities you have to buy a Mac. To get that message across, Apple will need to strongly encourage (read: fund) developers producing products that make good use of these technologies. Apple may have to design some products itself and market them through AppleSoft or Claris. Microsoft hasn't hesitated to develop software that exploits the strengths of its own operating systems. Neither should Apple.

### Copland's New Neighborhood

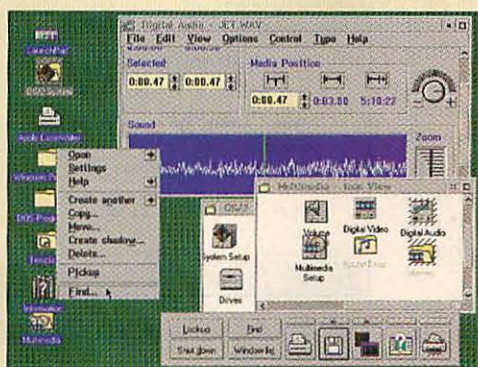
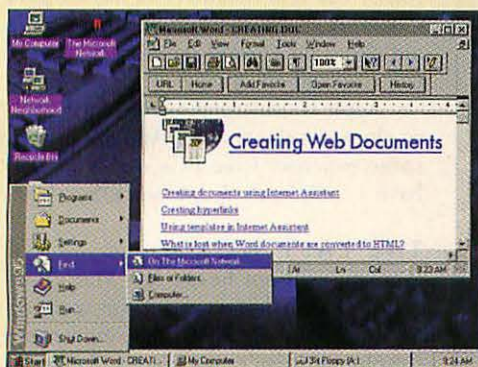
Assuming that Windows 95 is

developers to ensure that native Windows 95 programs also run on NT. That's smart, but it could cannibalize the existing Windows customer base, as people start moving from Intel-based systems to PowerPC-based systems.

Even if Apple and IBM can break Intel's dominance in the CPU market, Apple will still face the OS challenge on the PowerPC front. That's why Copland is so critical for Apple: Copland, if successful, will give the Mac a productivity advantage at the OS level that will keep the Mac competitive with Windows machines using the same inexpensive hardware platform that Apple does (see "Mac Hybrids," April 1995).

That leaves Windows 95 and Copland battling for the hearts and minds of the desktop users. When Copland ships, Apple won't convert Windows users into Macintosh users, or even convince a greater percentage of newcomers that the Mac is better. After all, the Mac was easier to use until at least 1992 when Windows 3.1 shipped, and that didn't matter much with consumers. Copland's ease-of-use features will be easy for Microsoft or third-party developers to duplicate in Windows 95.

To do more than hold its own, Apple must get programs to market with compelling benefits that Windows 95 just can't offer. In a surprisingly candid comment, one Apple product manager



Mac's compatibility with a variety of new technologies that Apple has been adopting, such as IDE and PCI.

Windows NT and OS/2 users suffer from driver problems. In both cases, when poor programming is not to blame, driver problems are usually caused by hardware dependencies left over from their DOS and Windows roots, that Apple's HAL aims to avoid.

### Common OS Services

In the past, Apple undercut adoption of some of its own technologies by making them optional. Developers typically avoid proprietary technologies, particularly optional ones and especially if those developers also market Windows versions of their soft-

must compete not just on features but also on how well the features work and how well they are perceived. This is where Apple is weakest: previously the company has arrogantly assumed that people would pay extra for pieces of the OS (people wouldn't—remember System 7 Pro?). But Apple is now doing the right thing, taking some of the steam out of Windows and OS/2 by offering some advanced features for the Mac now, giving developers and users time to get familiar with them before they become standard components.

The Mac has advantages in a few key areas that could become de facto standards if Apple makes them cross-platform: QuickTime is better than Video for Windows;

**Razzle-Dazzle** Both Windows 95 (left) and OS/2 (right) now offer slick, hip features such as Internet and multimedia support. They also offer some more useful features, such as context-sensitive pop-up menus, sophisticated find facilities, rich help systems, and automated tasks (in Windows 95 only).

reasonably stable when it ships, how will Copland compare with it, Windows NT, and OS/2?

OS/2 and Windows NT will continue to suffer from being niche products. IBM may not be able to change OS/2's niche status—the company should just accept that OS/2 is not a desktop OS for the masses and instead focus on marketing it correctly. Windows NT will suffer because it will be the "old" Windows and because there are not many NT-native programs. But Microsoft promises the Windows 95 interface for NT next year, and urges

admitted that Macintosh probably won't displace Windows as the business standard in the United States, but he said that Apple is gaining faster than Windows in the overseas market, which is only now beginning to see the adoption rate that occurred here in the mid to late 1980s. He also asserted that Apple is confident it will maintain and perhaps widen its lead in the areas where tomorrow's buyers set their expectations: the lucrative publishing and multimedia markets, the fast-growing home market, and the education market.



Fragment Manager, which makes sure that applications use only the latest installed version of a DLL. (Running multiple versions of a DLL under Windows can cause confusion about which version to use and can lead to system crashes.) The Code Fragment Manager also bars programs from using a DLL's memory, preventing conflicts among multiple programs using the same DLL.

### Active Assistance

Apple Guide is being enhanced with more do-it-for-me features and ways to automate tasks without programming AppleScript. For example, delegation is a form of active assistance in which users answer questions about a task they want to automate, and the Mac creates the script and handles its future execution (see the screen shots in "Help Me Along" and "Take Care of It for Me" for examples). The new Task Manager will keep you informed of the status of delegated tasks.

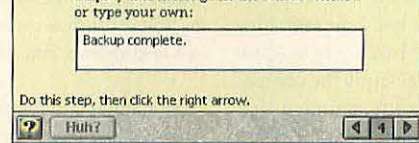
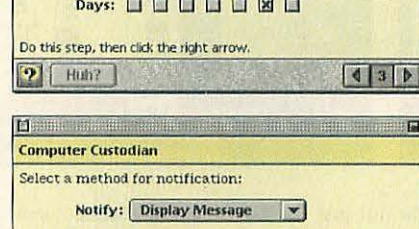
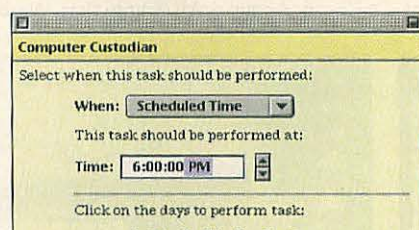
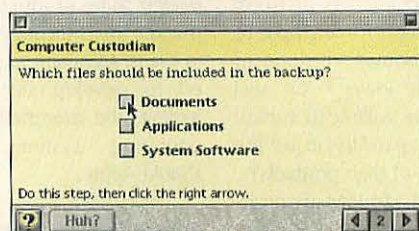
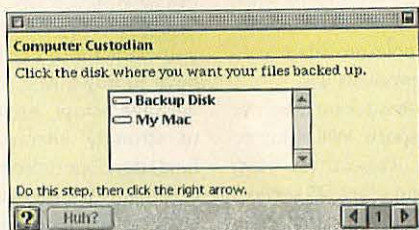
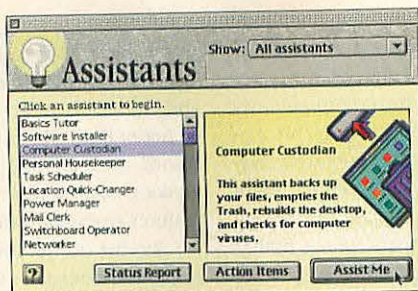
### Networking and Online Services

The new Open Transport networking service, scheduled to ship with the first PCI Power Macs in early summer, will replace today's AppleTalk-centric networking services by including a wider variety of network protocols, including AppleTalk, Novell IPX, and TCP/IP. Open Transport will also handle interactions between programs and the network protocol, so developers won't have to support every protocol and users won't have to worry about installing the right one (see "Open Transport Moves Along," *Networks* news, March 1995).

With multithreading, Apple expects Open Transport to support multiple network protocols and connections simultaneously. Thus, you could simultaneously synchronize your desktop Mac and your PowerBook through an infrared connection, get data from a NetWare server using IPX while checking your E-mail via AppleTalk on the same Ethernet network, and update a colleague's database via an Apple Remote Access session.

**Take Care of It for Me** Another form of Assistant is essentially an automated, recurring script, such as for a regularly scheduled system backup, that you create by answering a series of questions.

PowerTalk's collaboration services will be enhanced to provide a full set of E-mail features, such as return receipt, unsend, folders, and who's-read-this. One PowerTalk mission is to integrate all sorts of mail—internal E-mail, faxes, mail from the Internet and online services, and even voice mail—in just one in-box. Other PowerTalk capabilities include simplified server connections and digital signatures to authenticate electronic documents.



goal of having full NetWare server and client services on the Mac. Now, Apple is committed only to the Mac being a "first-class" NetWare client, an undefined goal.

### Other Services

Other System 7.5 options that become core OS components in Copland include AppleScript for scripting, PC Exchange and Macintosh Easy Open for foreign-file access, WorldScript for multilingual support, and ColorSync for color matching.

### LIFE AFTER COPLAND

Copland will ship first for Power Macs, and Apple has not decided whether to port Copland to 680X0 Macs. With most of Copland's major services—OpenDoc, Open Transport, QuickDraw GX, WorldScript, QuickDraw 3D, and so on—now available or soon to be available for 680X0 Macs, Apple may not have a strong reason to do much more for 680X0 Macs when Copland ships.

Apple's last 680X0 desktop Mac is probably the Performa 580, and there may be a 68040-based PowerBook this fall, which would be the last of its breed. The sooner Apple stops shipping 680X0 Macs, the less incentive it has to port Copland, of course, and in any case it's not clear that a 68040-based system could run Copland effectively.

Apple is also dropping the Mac ROM, so clone developers (and Apple) can save some expense. Like PCs, the Mac will have a completely disk-based OS.

### THE LAST WORD

Copland will not be the last Mac OS—Apple already has a small team working on its successor, Gershwin. Reinventing the plumbing isn't sexy, but it will give the Mac OS what it needs to be viable and forward-thinking in the years to come. Later this year, Apple will be competing against other PowerPC-based systems—its battle won't be just against Intel-based PCs running Windows. Windows NT for PowerPC is due by July, and OS/2 for PowerPC may ship this fall. With 18 months or so until Copland ships, there's still a lot of development work to do, and it's possible the early Copland prototypes that *Macworld* saw won't fulfill Apple's performance and functionality goals.

Still, where Copland is heading is impressive, and if Apple can get the Mac OS there, the Mac should enjoy a lasting, fundamental competitive advantage for multimedia, home, international, and publishing use. Here's hoping! ■

*Macworld* executive editor GALEN GRUMAN covers operating-system design and other emerging technologies.



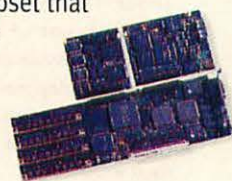
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# The Mac's Jazzy

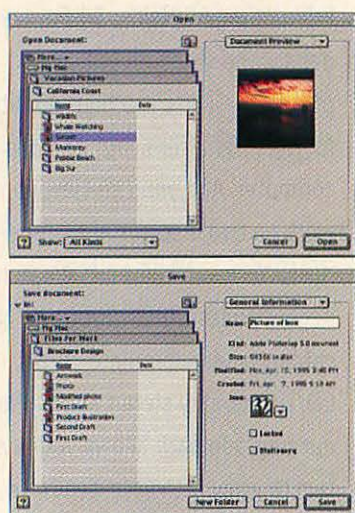
The new Copland interface

Although Copland's release is still about 18 months away, Apple has revealed part of the next Mac OS's new look. While some details are still under development, the images here show the elements that Apple is confident will survive mostly intact in the final version.

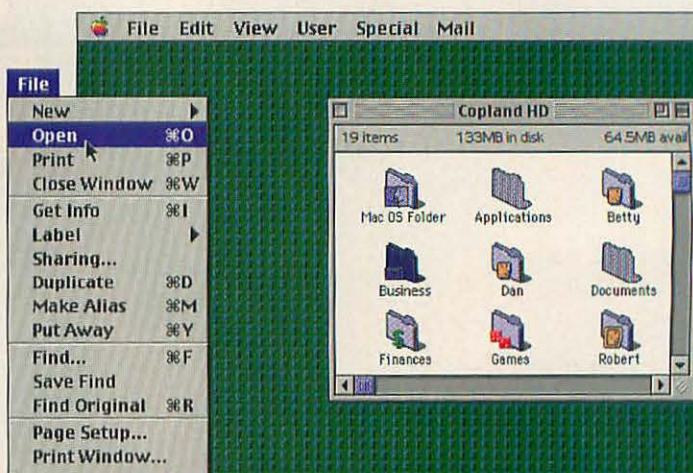
focuses on personalization, appealing style, and

Windows are now easier to move. You just grab onto any side and drag.

Menus reflect new features, such as customization options (User menu), reusable find criteria (File menu), and collaboration services (Mail menu).



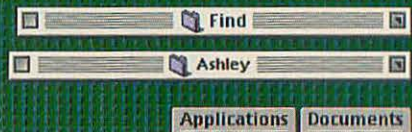
New Open and Save dialog boxes add preview and information palettes. Developers can also plug in their own palettes—for example, Microsoft could display Word's Summary Info in the Open or Save dialog boxes. The new dialog boxes also provide a more obvious representation of folder hierarchies and add a button to give quick access to favorite folders.



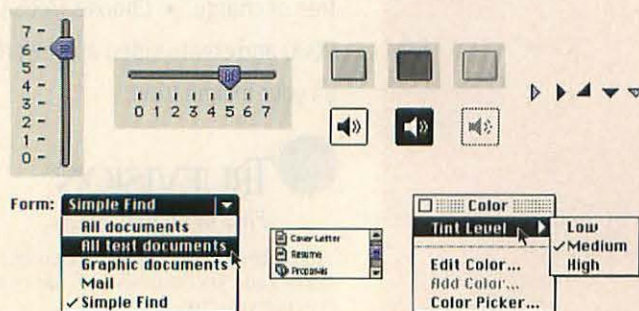
Friday, 6:00 PM. Hard Disk backup complete.

**Immediate:** Mail has arrived from your boss that needs immediate attention.

Alerts tell you the status of an automated task or an urgent communication.



Drawers help reduce desktop clutter. You can now activate the WindowShade feature (another clutter reducer) with a single click on a window.



Standardized interface elements should ensure greater consistency across applications. Most of these elements have evolved piecemeal; Apple is finally providing them ready-made for developers. Elements include vertical and horizontal sliders, buttons and triangles, pop-up menus, scrolling lists, and tear-off menus.



BY GALEN GRUMAN

# New Face

usability, not on change for its own sake

Windows is getting its third major face-lift in six years. OS/2 has been prettied up to appeal to the average PC owner. Even Unix interfaces are looking rather slick these days. And the Macintosh Operating System? Its look and feel hasn't changed significantly since Apple added color in 1987. With

Copland, the next-generation Mac OS that's scheduled for release in 1996, will Apple make sweeping changes to its interface in response?

No.

Apple's interface has stood the test of time—the company sees no reason to start over. And my recent survey of top interface researchers in the PC and Mac communities shows that, indeed, there is no interface revolution brewing somewhere just waiting to be exploited—nothing equivalent to the work at Xerox in the early 1980s that provided Apple with a fundamentally new alternative to the command-line interface.

Even the major interface changes Microsoft is planning for Windows 95 are primarily meant to make room for built-in system services such as remote access (similar to changes that Apple has been making for a couple of years), to reorganize elements of the interface, and to streamline user operations. All of these changes are important, but none of them are fundamentally different from the now-familiar graphical interface and desktop metaphor.

So while Apple has decided to jazz up the Macintosh interface to make it more fun and to add more system services, its real effort in Copland focuses on making underlying changes to the Mac OS that should result in better functionality, rather than just a new look (see "The New Mac OS Unveiled," in this issue).

## Keeping Up with the Times

But don't dismiss the new look. While it refines the Mac look you already know and love, it also signals Apple's intention to stay apace of today's styles. The new buttons and bars have 3-D shading, icons and folders appear in 3-D perspective, and the overall look is a bit more high-tech; sometimes it's a little too much like the changes Microsoft is making in Windows 95. (You can download some of these icons, for use in your current system, from Macworld Online, available on America Online and eWorld.)

Three-dimensional icons and attributes are used throughout.

The enhanced Find feature will let you save search routines that constantly update their contents. That would let you create searches on the Internet or on a server to find, for example, the latest shareware or financial reports. Apple is also adding the ability to search for text inside files.

The Task Manager provides quick access to all the automated tasks you've assigned Apple Guide to take care of.





**More Standardization** Some of Copland's interface changes are subtle but important. For example, it standardizes many interface elements—tear-off palettes, radio buttons, slider controls, and the triangles that reveal and hide submenus or subfolders in hierarchies—that third-party developers have been creating in ad hoc fashion for years.

**Enhanced Capabilities** Several modernizing look-and-feel changes also add significant new features. For example, to drag a Copland window you can grab onto any edge, not just the title bar. Some dialog boxes have new features, too: the Open and Save functions can show file previews and provide an optional space for other information. While these sorts of elements have been available as third-party utilities for years, they will now be standard features—at no extra cost.

To take advantage of some of these features, developers will have to rewrite their programs. But other features will appear automatically in programs that use System 7's built-in equivalents. For example, any program using System 7's standard windows and dialog boxes will automatically use the new ones when running under Copland.

### Improving the User Experience

Other changes affect not just the look, but also how you interact with the Mac.

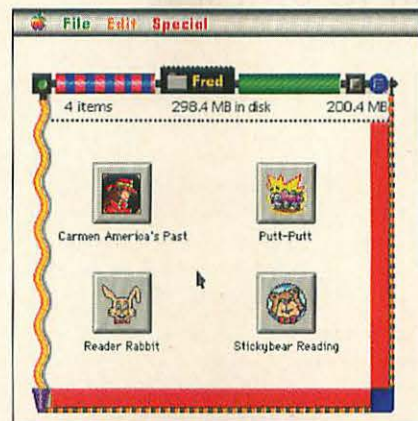
**Less Clutter** Consider Apple's variant on an old Windows trick called Minimize, which reduces a window to an icon at the bottom of the screen, where it is easy to access but out of the way. In Copland, if you drag a folder to the bottom of the desktop, it becomes a drawer, which reduces its size on screen much as System 7.5's WindowShade utility now does. WindowShade remains in Copland, and a new icon in the upper-right corner of the folder window collapses a folder with one click. Drawers are a handy place for elements that you use frequently but don't want cluttering up your desktop (you probably have folders along one side of your desktop now to achieve this goal). WindowShade, on the other hand, temporarily reduces the space taken up by windows you leave open. Neither approach feels more or less natural to me than Windows' Minimize approach.

**Simpler File Movement** A simple change, but a real time-saver, is the auto-open folders feature: As you hold a file or folder icon over a folder, the folder opens, which simplifies moving an item into a folder that is buried several levels deep. And when you let go of the mouse button to drop the item into the destination folder, all the folders you opened along the way close.

### The Interface You Want

Beyond the new embellishments and operational refinements, Apple has adopted an approach that has been gaining popularity in other platforms, including OS/2 and Windows: personalized interface styles.

**Custom Look and Feel** With personalized styles, the Mac won't work differently, but you will be able to make your Mac reflect the personality you want to convey. These styles will affect the way windows look, the fonts in menus and dialog boxes, the sounds that play when you perform certain actions (such as opening a folder), the desktop pattern, and even animations that accompany



actions. The interface style can be as crass, staid, or energetic as you want. Edmark's Kid-Desk program and even Apple's At Ease interface shell offer a more primitive version of this idea today.

Apple will package a variety of personalized interface styles with Copland, and it expects other companies to sell style collections. It's even possible for a company to develop an interface editor that would let you create your own look, although that capability will not be built into Copland.

### A Mac for All Tastes

Copland will let you make radical changes to the look and feel of your desktop by selecting a personalized interface style, much as you can now change the desktop pattern or select a screen saver. Apple and other companies will provide collections of styles that determine not just the look of the interface, but also the animations and sounds associated with actions.

**One Mac, Many Users** Copland will also offer another type of customization, which Apple calls a scalable interface. It will let you remove different items (such as the Trash) and menu options (such as Sharing) so you can set up individual environments for different people. Each user will choose his or her own work environment and enter a password.

You can use this to reduce the clutter of never-used items—do you really need all those control panels?—or to prevent your children from throwing away your files (you would just create an environment for them with no Trash Can). For Macs shared by different people—at the office, perhaps, or at home—this is great. And if you move from Mac to Mac you can take your environment with you on a floppy disk. Each environment can have its own personal interface style. But Apple will not provide encryption or real security for work environments—a major weakness in the implementation, one that underscores Apple's focus on multiple users sharing a Mac at home or a user switching between notebook and desktop Macs, rather than on multiuser business environments.

### The Last Word

Don't be surprised if the final Copland interface—due about 18 months from now—has other embellishments and operational changes. Apple is nowhere near being done with Copland, although the company is confident that what it has so far revealed will survive mostly unchanged in the final version.

Whatever Copland's final features, the transition to the new OS should be comfortable for the Mac community. The adaptation of today's look will reinforce the message that the Mac interface may be an old-timer, but it is not aged.

There are other advances over System 7.5 that I'd like to see in Copland, such as the context-sensitive pop-up menus offered in OS/2 and Windows 95. Maybe I won't be disappointed. But no interface will satisfy everyone, since we all like different things. That's what drives the market for screen savers, icon editors, and other personalization tools. On the whole, Apple's decision to stick to the tried and true, enhancing instead of replacing what Mac owners have long loved, is the right thing to do. **m**

Macworld executive editor GALEN GRUMAN covers interface issues and other emerging technologies.

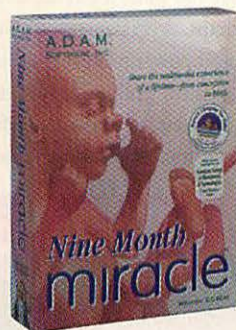


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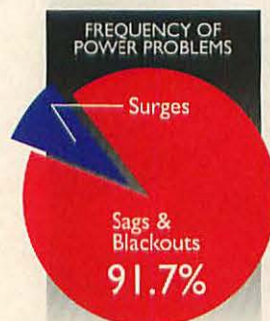
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Simply put, if power problems are the least of your troubles, you've got one chance to keep it that way. You insure your car and home with the best policy you can afford. It just doesn't make sense to



Source: Contingency Planning



Source: Bell Laboratories

Power problems are the leading cause of computer data loss, while the most frequent type of power problems are under-voltages and blackouts, which surge suppressors alone are powerless to protect against.

leave your Mac (which is at far greater risk) vulnerable to loss or damage.

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Contrary to most people's belief, a Mac alone has more protection built into it than a low-end "surge suppressor," which is usually nothing more than a well-packaged extension cord. In other words, going without protection is as good as under-spending on one of the most important computer decisions you'll make.

And since sags and blackouts represent more than 90% of power problems likely to hit your Mac, even quality, high-performance surge suppressors are literally powerless to protect your Mac from data loss.

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Modern Press President Stephen Hopkins explains, "I protect my Mac Performa with a Back-UPS 400 and the unit works great. The Mac handles all bookkeeping, administrative and estimating functions for the company. It is a critical piece of my business. Unfortunately, we are located in an industrial park... a nice way of saying that our power fluctuates a great deal. After five years of reliable performance from my Back-UPS, power problems are no longer my concern. I can focus my energy on my business instead."



At Cellophane Square, Seattle's best known independent and alternative rock record store, Steve Marcus, Product Buyer, counts on APC to keep his Mac II SI and POS terminals running reliably. "The building where we started out was ancient and full of power problems. I lost lots of purchasing and product related information... until we invested in APC. I chose APC because they offer the most reliable product. I haven't been proven wrong yet. Problems continued in the building, but they were no longer a problem for us."



"We have over 30 APC units on our Macs," says Tim Girvin, principal of Tim Girvin Design, Seattle, WA. "Why do we protect every computer in the firm with an APC? As design consultants working on projects throughout the United States and Asia, 100% productivity is critical to project management. We cannot afford lost files due to power outages because of the complexity of many of the design programs we manage. Lost projects due to unprotected files is simply irresponsible. With APC in place, power problems are not even an issue, we are protected."





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**MacWEEK** "Ultimately, it's more a question of when - and not if - you should buy a UPS... UPS power protection has never been cheaper or more convenient"

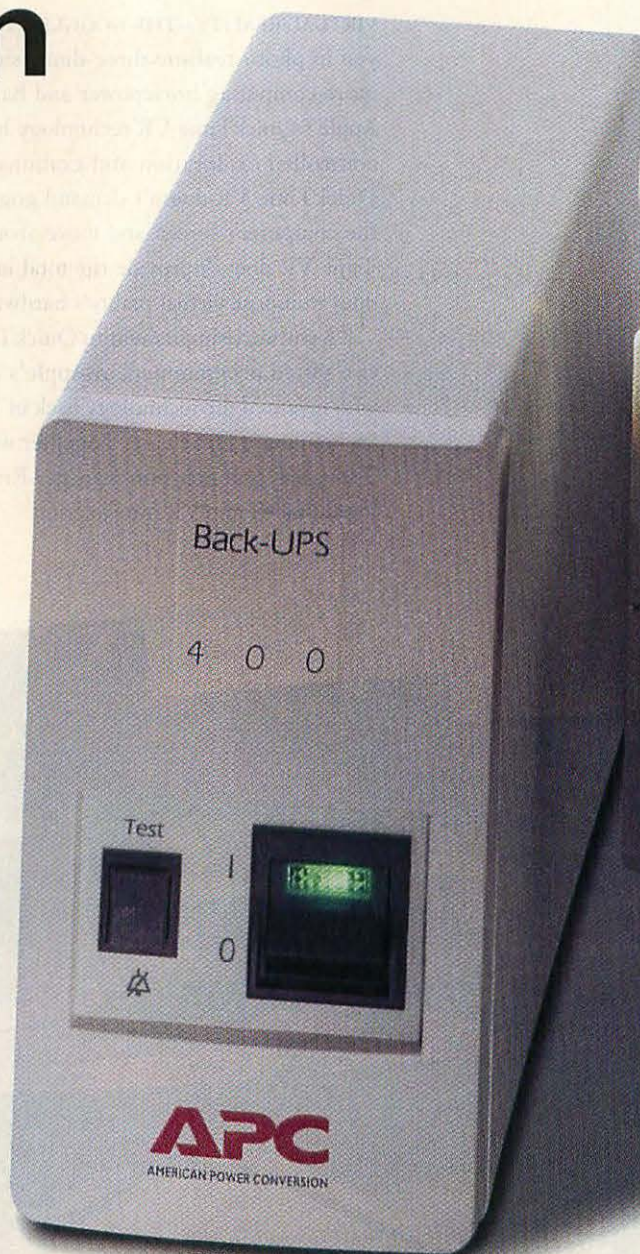
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# VR: QUICKTIME'S

VIRTUAL REALITY—THE GOGGLES-AND-GLOVES TECHNOLOGY THAT IMMERSSES you in photo-realistic three-dimensional worlds that you can explore—requires more computing horsepower and hardware than a personal computer provides. Apple's QuickTime VR technology brings the best parts of virtual reality—user-controlled exploration and examination—to Macs and Windows computers. QuickTime VR doesn't demand goggles or gloves; you view a virtual world on the computer's screen and move around using your mouse or keyboard. QuickTime VR doesn't provide the total immersion of true virtual reality, but neither does it impose virtual reality's hardware requirements. Think of it as virtual VR.

A software supplement to QuickTime 2.0, QuickTime VR is the brainchild of two gifted programmers in Apple's Advanced Technology Group: Eric Chen, who invented the technology back in 1991, and Ian Small, who's been responsible for refining it for release. Together with QuickTime VR senior content engineer Ted Casey and program manager Eric Zarakov, Chen and Small gave me a day-long QuickTime VR introduction.

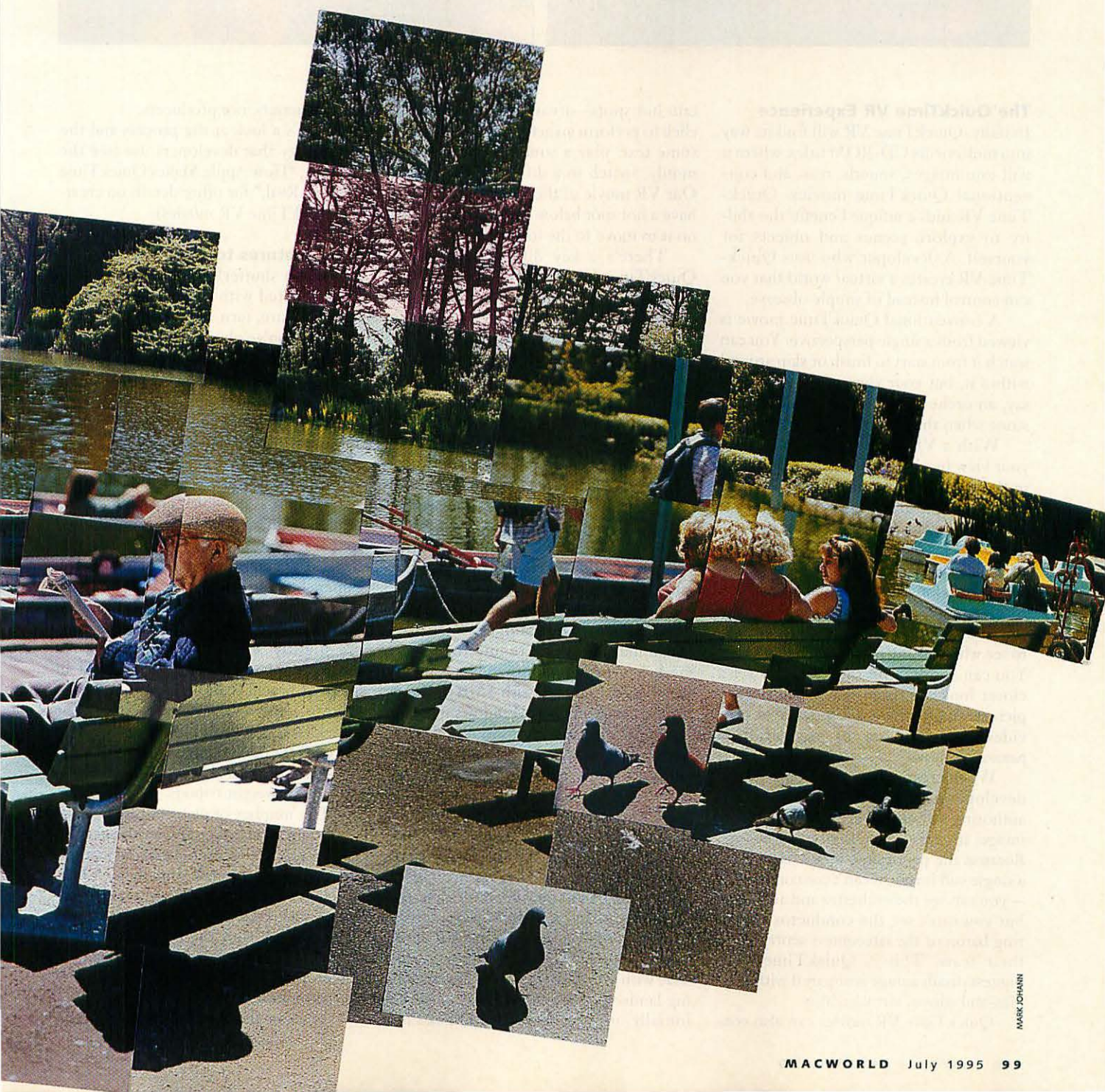




Apple's QuickTime VR brings the best of virtual reality to personal computers

# NEW EDGE

by Jim Heid



MARK CHANN



# STAR TREK: YOU ARE THERE



## The QuickTime VR Experience

Initially, QuickTime VR will find its way into multimedia CD-ROM titles, where it will join images, sounds, text, and conventional QuickTime movies. QuickTime VR adds a unique benefit: the ability to explore scenes and objects for yourself. A developer who uses QuickTime VR creates a virtual world that you can control instead of simply observe.

A conventional QuickTime movie is viewed from a single perspective. You can watch it from start to finish or skip around within it, but your view of the subject—say, an orchestra on a stage—was cast in stone when the original video was shot.

With a VR movie, you can change your view by clicking and dragging within the movie or by using the keyboard's left- and right-arrow keys. For example, dragging to the left causes the view to change as if you were turning your head to the left, while dragging up is the equivalent of looking up (see "Star Trek: You Are There"). Not only can you see the orchestra, but you can also turn around to see who's sitting in the row behind you. You can zoom in on the orchestra for a closer look, or zoom out to see the big picture. Apple calls a VR movie that provides this freedom of navigation a *panoramic movie*.

When creating a panoramic movie, a developer uses Apple's QuickTime VR authoring software to create a 360-degree image; it's this image that you navigate. Because the panoramic movie is actually a single still image, it can't contain motion—you can see the orchestra and audience, but you can't see the conductor's blurring baton or the latecomers scurrying to their seats. This is QuickTime VR's biggest disadvantage compared with goggles-and-gloves virtual reality.

QuickTime VR movies can also con-

tain hot spots—areas on which you can click to perform an action, such as display some text, play a sound, or most commonly, switch to a different VR movie. Our VR movie of the concert hall might have a hot spot below the exit sign—click on it to move to the lobby.

There's a key difference between QuickTime VR hot spots and the hot spots in non-VR CD-ROM titles: a QuickTime VR hot spot is embedded in the movie itself, and moves along with its object as you move around in the panoramic. In non-VR CD-ROM titles, hot spots are just static points on the screen; they aren't part of QuickTime movies.

Clicking on a VR hot spot might also allow you to examine a specific object from different angles by clicking and dragging—it's the QuickTime VR equivalent to picking up an object and turning it around. This kind of exploration is provided by a different type of QuickTime VR movie, the *object movie*.

Fortunately, as with linear QuickTime movies, QuickTime VR movies' consumer hardware requirements are modest. Apple recommends a 25MHz 68030 or faster Mac with 5MB of memory, or a 33MHz 386 Windows machine with 8MB of memory. And QuickTime VR movies themselves are remarkably compact—one panoramic movie uses only about 800K of disk space.

Unfortunately, QuickTime VR movies are expensive and complex to create. Apple's QuickTime VR authoring tools, the only software available for making VR movies, cost \$2000 and are difficult to use. ("You've got to be a wirehead to get this stuff to work," one QuickTime VR developer told me.) They also require a fast Mac with 40MB of memory. The authoring landscape may change over time, but initially, most of us will be QuickTime

VR consumers, not producers.

Here's a look at the process and the technology that developers use (see the diagram, "How Apple Makes QuickTime VR Feel Real," for other details on creating QuickTime VR movies).

## From Pictures to Panorama

If you're a shutterbug, you've probably experimented with panoramic pictures: snap a picture, turn, snap another, and so on, until you've photographed a vista too grand for a single picture. Then you arrange the photos on a tabletop, aligning them where they overlap.

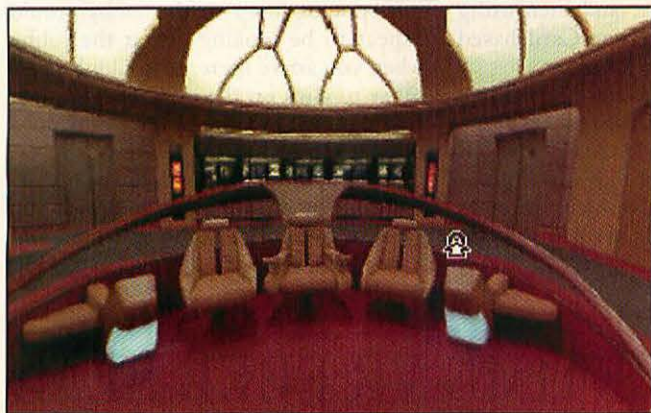
The first steps in creating a QuickTime VR panoramic movie are similar. Mount a camera on a tripod, orienting it vertically to capture as much of the subject's height as possible. To avoid distortion, the camera must be level and aligned so that it rotates around its optical center. Because a camera's tripod mount is on the camera body and not on the lens, a tripod-mounted camera will not rotate around its optical center unless you offset the camera slightly. Creating this offset today means using a heavy-duty tripod and an array of brackets and tripod heads containing levels (see "Photographing for QuickTime VR"). Apple is working with third-party developers to create simple low-cost brackets that would enable the use of lightweight tripods.

The number of pictures required for a full panorama depends on the camera and lens. Apple recommends using a 35mm camera with a 15mm lens. (A fish-eye lens won't work.) Apple also recommends that each image have 25 to 40 percent overlap with the adjacent images. That's more overlap than you'd use for tabletop panoramas, but it leads to a better panoramic movie.

You can also take 360-degree images



QuickTime VR lets you explore locations using the mouse or the keyboard's arrow keys. The scenes shown here are from the first CD-ROM to use QuickTime VR, Simon & Schuster Interactive's *Star Trek: The Next Generation Interactive Technical Manual*.



**Left:** We're on the bridge of the USS *Enterprise*. We can look left and right or zoom in and out if we want, but in this screen, we're about to jump to a different bridge location—the helm station. (The arrow pointer means the mouse is over a hot spot that leads to a different location.) **Middle:** We've arrived at the helm station and we're in the process of turning to the right, as indicated by the right-pointing arrow. **Right:** We've turned almost 180 degrees to look at where we came from. The mouse is over the hot spot that, if clicked, will return us to our original location. (For information on this \$69.95 CD, call 212/698-7000.)

using panoramic cameras, which contain motorized mechanisms and special shutters for capturing a 360-degree image in one fell swoop. One drawback, however, is that panoramic cameras are expensive, ranging in price from \$1000 to over \$15,000. Another drawback is that the resulting image is likely to have areas that are poorly exposed—for example, in a panoramic of a sunrise scene, the area opposite the sun will be too dark. By comparison, if you take individual photos and adjust the exposure for each, the QuickTime VR software can blend adjacent images to provide a smooth dynamic range across the panorama.

You'll snap a dozen or so photos to capture a 360-degree scene. Your next job is to get them into digital form by scanning them or having them transferred to Kodak Photo CDs. Many QuickTime VR developers prefer the Photo CD approach—Photo CD scanners yield better images than most desktop scanners, the Photo CD supplier does the grunt work behind scanning the images, and the discs are an ideal archiving medium.

The previous descriptions assume you're working with photographs, but you can also create a VR movie from a series of images generated by a 3-D rendering program—a prospect likely to lead to a new generation of *Myst*-like adventure titles.

### Stitching Time

The job of combining individual images into a 360-degree panorama falls to a program called the *Stitcher*, part of the

QuickTime VR authoring kit. The *Stitcher* is the most important component of QuickTime VR—without it, creating a photographic QuickTime VR movie would require one of those expensive and inflexible panoramic cameras.

The *Stitcher* combines multiple images into a single file. That's the simple description. The *Stitcher* performs what computer graphics gurus call *enviromapping*—mapping, or projecting, an environment (such as a concert hall) onto the inside of a shape, such as a cube or sphere. In QuickTime VR's case the shape is a cylinder. When you navigate a QuickTime VR movie, you are in essence moving within a vertically oriented tube whose inner walls contain the panoramic image. The *Stitcher* distorts the original images—which were intended to appear on a flat surface—then combines them into a seamless panoramic image.

The *Stitcher* usually performs its magic automatically by comparing the pixels in each image to locate the points where they overlap. If the images don't overlap neatly—perhaps one was scanned crookedly or the tripod moved during the photo session—you can use a manual-stitching mode, which lets you use the keyboard's arrow keys and number pad to move and resize images. But according to Apple, 80 to 90 percent of properly photographed panoramas can be stitched automatically. On a Power Mac 8100, automatic stitching takes about 5 minutes; on a Quadra 900, it takes about 40. Exact stitching times depend on the resolution and quantity of the images.

As it combines images, the *Stitcher* blends the intensity levels of each one to compensate for differences in lighting or exposure. The more the images overlap, the smoother the blends.

### Painting Hot Spots

The *Stitcher*'s end product is a PICT file containing the complete panoramic. When opened in an imaging program such as Adobe Photoshop, the PICT file appears warped and distorted. But the scene is clearly recognizable, and you won't find a single seam that gives away the image's past as a dozen separate images.

At this stage, you can use any image-manipulation program to correct color balance, retouch a flaw, or remove an unwanted object. You can also create hot spots that will cause things to happen, such as a text description to appear or an object movie to be displayed.

If you've created hot-spot buttons in an authoring package such as HyperCard or Macromedia Director, you're probably used to using a click-and-drag tool to select the area to be made hot. QuickTime VR approaches hot spots differently: you actually paint them using an imaging program. For example, to create a hot spot for a sculpture, you paint over the sculpture with a solid color. To create another hot spot for another sculpture, choose a different color and then paint it. By giving each hot spot a unique color, you enable QuickTime VR to distinguish between hot spots.

After painting hot spots, erase the rest



of the image and then use the Save As command to create a new image file containing only the hot spots. During a later phase of the development process, a QuickTime VR authoring tool combines this hot-spot image with the original panoramic. The painted hot spots don't appear on the screen when the VR movie is playing, but QuickTime VR knows where they are. When the mouse pointer moves over a hot spot, its shape changes to tell the viewer that he or she can click on the spot to make something happen.

The painting approach to creating hot spots is more laborious than an authoring program's draw-a-selection approach, but it has unique advantages. It allows you to create extremely precise hot spots—right down to the single-pixel

level. And this makes possible dramatic on-screen effects, such as everything except the hot-spot object disappearing when you click on the object.

### From One Place to Another

An important part of the QuickTime VR experience involves moving between locations. Making this experience possible requires creating a separate panoramic for each location, or *node*, and then using QuickTime VR's HyperCard-based scene editor to link the locations.

Making a conventional QuickTime movie means thinking like a movie director; making a multinode QuickTime VR movie means thinking like a tour planner. You must address such issues as where a user is looking and where the user

can go from a given location. Multimedia developers have always had to think about navigation, but because a VR movie can display any portion of a 360-degree panoramic, developers must decide which portion of a panoramic should be visible when a user jumps to it. That view would vary depending on where the user came from. For instance, in my concert hall example, when you click on the exit-sign hot spot to jump to the lobby, you'd expect to be looking out at the lobby when you arrive there. It wouldn't make sense to click on the exit sign and then find yourself looking at the lobby door that leads back into the concert hall.

The scene editor helps you plan a virtual tour by enabling you to draw a top view of the entire scene and then add

## HOW APPLE MAKES QUICKTIME VR FEEL REAL

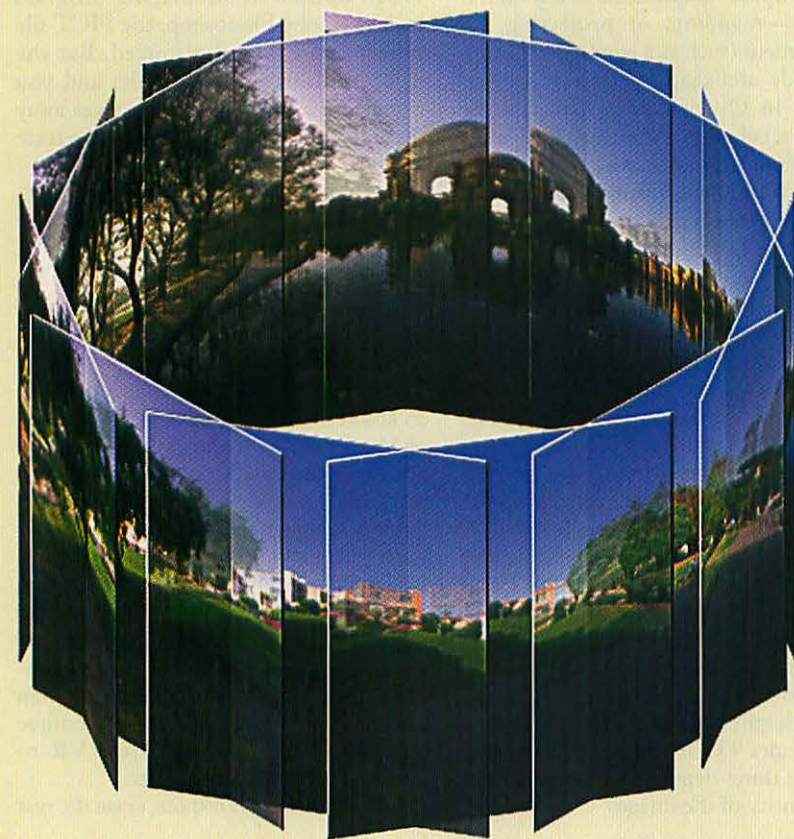
Apple's latest foray into you-are-there technology, the QuickTime VR movie, sets you in the midst of a navigable, 360-degree scene and lets you explore the virtual environment. Apple's VR approach overcomes various problems inherent in patching together a series of flat images and projecting them onto a cylinder to create a three-dimensional feel. While competing technologies require the use of special, expensive, panoramic cameras, VR developers can use an ordinary camera to capture a scene that surrounds you and lets you pan up, down, and side to side.

### Capturing the Scene

You capture a scene by shooting a series of overlapping photos. Mounting the camera on a tripod lets you keep the same center point as you swivel the camera; the tripod also keeps the whole series on a level plane, ensuring that the first and last shots in the sequence will line up.

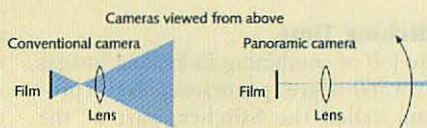
### Making the Movie

You might think you could create a scene by simply butting pictures taken with a conventional camera up against each other (A). But unless taken with a panoramic camera, the pictures won't normally match up. QuickTime VR compensates for misalignment by distorting or warp-



### Why QuickTime VR Emulates Panoramic Photography

A conventional camera exposes a whole rectangle of film all at once, and only the center of the frame faces the scene straight on. Toward the sides, the scene is exposed at an increasingly oblique angle, creating distortion. A high-end panoramic camera pans around a scene, exposing the film through a narrow slit. At any given moment, the camera captures a thin slice at the center of the camera's view, and the incoming light for each exposure hits the film straight on and without distortion.





nodes corresponding to each of the panoramics you've created. You can draw hot spots on a given panoramic that, when clicked, will display other panoramics. You can specify what part of a panoramic will be displayed when a user jumps to it.

The scene editor generates a series of PICT files containing the hot spots along with a file containing information that tells QuickTime VR what part of a panoramic to display. Another utility in the QuickTime VR authoring kit combines these files into a finished QuickTime VR movie—a single file containing as many locations as you defined.

### The Bigger Picture

Most QuickTime VR movies are built into multimedia productions that also

contain text, sound, still graphics, and linear QuickTime movies. Apple has created a series of external commands (XCMDs) that enable developers to access QuickTime VR movies within Director or HyperCard. The XCMDs extend Director's and HyperCard's capabilities, letting them open QuickTime VR movies, scale them to a specific size (most CD-ROM titles display QuickTime VR movies at the quarter-screen resolution of 320 by 240 pixels), and display a specific portion of a movie at a specific zoom setting. For developers, integrating finished QuickTime VR movies into a production is similar to integrating linear movies.

The QuickTime VR XCMDs also enable QuickTime VR to communicate with the authoring program by sending

messages when various events take place. These messaging features enable a production to display text or pictures when someone clicks on a VR movie's hot spot.

Developers can also use the messages to play sounds—indeed, this is the only way the first release of QuickTime VR can work with sound. Future versions are likely to have more sophisticated sound features that will enhance the virtual reality experience. Imagine a virtual walk in the woods, where a babbling brook becomes louder as you approach it; imagine exploring a hotel room and hearing traffic noise increase as you approach the window. For now, you have to imagine these things, because the current incarnation of QuickTime VR is geared toward the eyes, not the ears.

ing (B) each image so that it appears as if it were taken by a panoramic camera. Once warped, images will match when they overlap (C). QuickTime VR then analyzes the areas of overlap and blends, or *stitches* the images together (D).

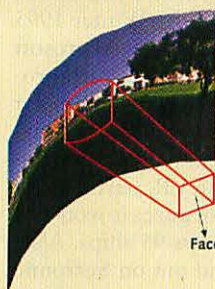
Once all the images, including the first and last, are stitched together into a virtual cylinder, the panorama is complete (E). Because QuickTime VR treats the scene as a single image wrapped inside a cylinder, you can pan around the image (instead of sliding

along it as you would when it's flat). You can even pan up and down and continuously from side to side in either direction.

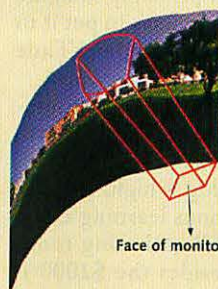


### Viewing the Scene

Now that you're done making the movie, you'll want to view it on a flat medium. As you might suspect, simply projecting a series of slices from the cylindrical image onto your monitor won't create a realistic view. To compensate for distortion caused by warping, and to heighten the realism, QuickTime VR manipulates the image, instantaneously, as you pan around the movie.



QuickTime VR compresses the image in the center. This compression makes objects increase in size as they move toward the edge of a view, giving side-to-side panning a more realistic feel.



To increase the realism of a vertical pan, QuickTime VR brings data in from the sides of the image at the top (as you pan up) or bottom (as you pan down). This simulates the sensation that your field of vision broadens as you look up or down, as it does in real life.



# PHOTOGRAPHING FOR QUICKTIME VR



MARK JOHANN



JOHN BOJEN

To avoid optical distortion when creating a photographic panoramic, you must mount the camera so that it rotates around its optical center.

The camera on the far left uses an array of brackets (available at photo dealers) to offset the camera from the tripod head. Small levels attached to the camera's flash mount enable you to adjust the tripod head so that the camera is level—if it isn't, the last photograph in the panoramic will not match up to the first. A simplified mounting bracket (near left) is being developed by Peace River Studios (617/491-6262). Rube Goldberg tripod mounts aren't all you need for QuickTime VR development. You also need a fast Mac with at least 40MB of RAM to run Apple's \$2000 QuickTime VR authoring tools software. And don't expect click-and-drag moviemaking; the authoring tools, which rely on Apple's Macintosh Programmer's Workshop (MPW) programming environment, use a crude text-based interface. They're extremely powerful, but the learning curve is steep.

## The Last Word

The future of QuickTime VR looks auspicious. Apple has already demonstrated enhanced versions of QuickTime VR that enable Power Macs to display full-screen VR movies. And there's no reason that QuickTime VR couldn't be made to work with the inexpensive video-game gloves and television glasses available today. Low-cost peripherals like these would help make QuickTime VR more like goggles-and-gloves virtual reality.

In the near term, though, consumers will encounter QuickTime VR on their video monitors, and primarily in CD-ROM titles. That's too bad—you've probably thought up a few fun ways to use QuickTime VR already, and if you're an architect, real estate agent, teacher, or travel agent, you can probably imagine some genuinely valuable ways to put it to work. For now, we'll explore QuickTime VR movies instead of creating them.

As for developers, there are definitely content and marketing advantages to catching the QuickTime VR bandwagon, but the cost of ridership is high. In addition to the mountainous learning curve of the QuickTime VR authoring tools, there's the price: besides the \$2000 it charges for the authoring tools, Apple requires a royalty of 40 to 80 cents per

unit on CD-ROMs containing QuickTime VR movies. (The amount varies depending on how many VR movies a title has; there are no royalties for non-commercial applications.)

Pioneering QuickTime VR developers I talked to were not pleased with the idea of paying Apple royalties in perpetuity. Some have halted their efforts in the hopes that Apple's policy will change. Peter Black, president of Xiphias, whose titles include a CD-ROM based on the Mighty Morphin Power Rangers, expressed similar frustrations: "The technology and its visual effect are extraordinarily powerful, but Apple has treated it as if it were a crown jewel... I've seen this at Apple before—it's very frustrating."

What's more, QuickTime VR has competition—and wouldn't you know, it's from Microsoft. At the Winter 1995 Consumer Electronics Show, Microsoft announced Surround Video, which provides full-screen panoramic movies for 486 or faster Windows machines. Surround Video has serious limitations compared with QuickTime VR, starting with the fact that it's vaporware: it won't be available until Windows 95 ships. Also, you can't zoom in and out on Surround Video movies, and developers must use a panoramic camera to shoot scenes—

there's no equivalent to the QuickTime VR Stitcher. (This impacts not only costs but also quality: panoramic cameras typically have a smaller vertical field of view than the camera configuration Apple recommends for QuickTime VR movies.) But the Surround Video development tools will be free, and Microsoft will not charge royalties on Surround Video titles.

QuickTime VR is an impressive achievement that reinforces Apple's role as the innovator in personal computer multimedia. But Apple's zeal to turn QuickTime VR into a profit center may slow its initial adoption and perhaps even relegate it to the backseat of Microsoft's limousine. As this issue went to press, Apple was reconsidering its requirement that developers pay royalties on titles that incorporate QuickTime VR. As well it should. Whether we're talking about QuickTime VR or the Macintosh Operating System itself, Apple needs to make its technology more accessible in order to gain the market share it needs. There's nothing virtual about that reality. ■

Contributing editor JIM HEID is the author and producer of *Macworld Complete Mac Handbook Plus Interactive CD*, third edition (IDG Books Worldwide, 1994).



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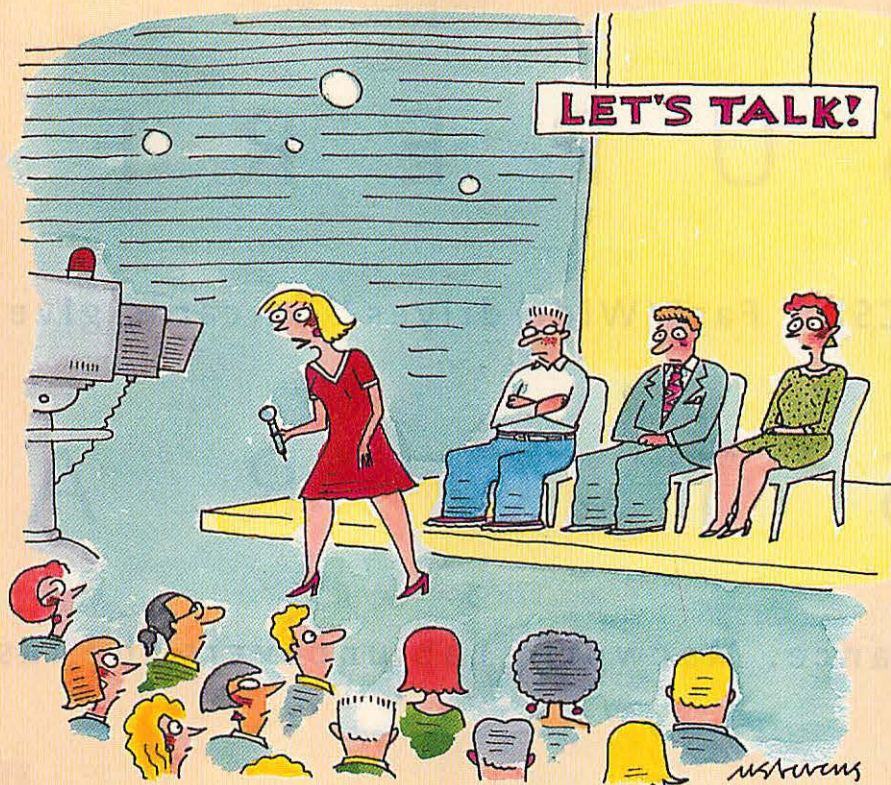
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you need it. Your Photoshop files are getting bigger all the time, your Premiere projects require full-screen video, and you're now scheduling 4th Dimension searches to run during your lunch break. Almost every product in the latest crop of high-capacity hard drives features SCSI-2 Fast capability, but many drives now feature SCSI-2 Fast/Wide capabilities, with the promise of the fastest possible performance. To dis-

cover whether SCSI-2 Fast/Wide capabilities offer a significant performance advantage over the more common SCSI-2 Fast-only drives, Macworld Lab took a definitive look at high-capacity hard-drive performance, analyzing all the elements that go into tuning your drive subsystem for maximum performance.

We tested 12 drive mechanisms, 6 formatters, and 2 SCSI-2 Fast/Wide cards in search of that elusive combina-

tion that would yield the best performance. Our tests confirm some basic assumptions: that for best results you need to buy a third-party SCSI-2 card, rather than rely on the Mac's internal SCSI interface—even the fast internal SCSI-2 interface available only on the Power Mac 8100.

Macworld Lab's results show that a Fast/Wide drive used with a SCSI-2 Fast/Wide accelerator card provides the best possible performance, which you'll want if your tasks include video editing, file service, prepress, and large database applications.

You need a combination of drive and card because both contribute to the overall speed. The accelerator itself increases a Fast-only drive's performance by 10 to 15 percent. And moving from Fast to Fast/Wide gains an extra 5 percent, according to our tests of the same mechanism in Fast-only and Fast/Wide drives.

All current Macs use standard SCSI-2 for the external port, but only the Power Mac 8100 uses SCSI-2 Fast for its internal SCSI connector. (Don't mix Fast and non-Fast drives on the same SCSI chain;

doing so degrades the speed of the Fast devices.) No Mac has built-in Fast/Wide connections, so for top performance you need one of the two SCSI-2 Fast/Wide accelerator cards: FWB's JackHammer (\$799; 415/325-4392) and Atto's SiliconExpress IV (\$995; 716/691-1999).

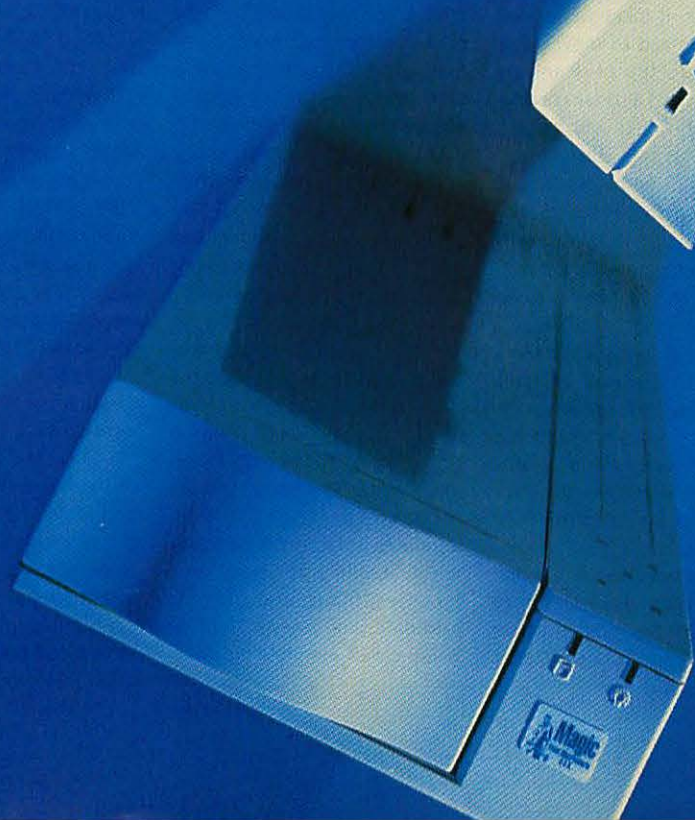
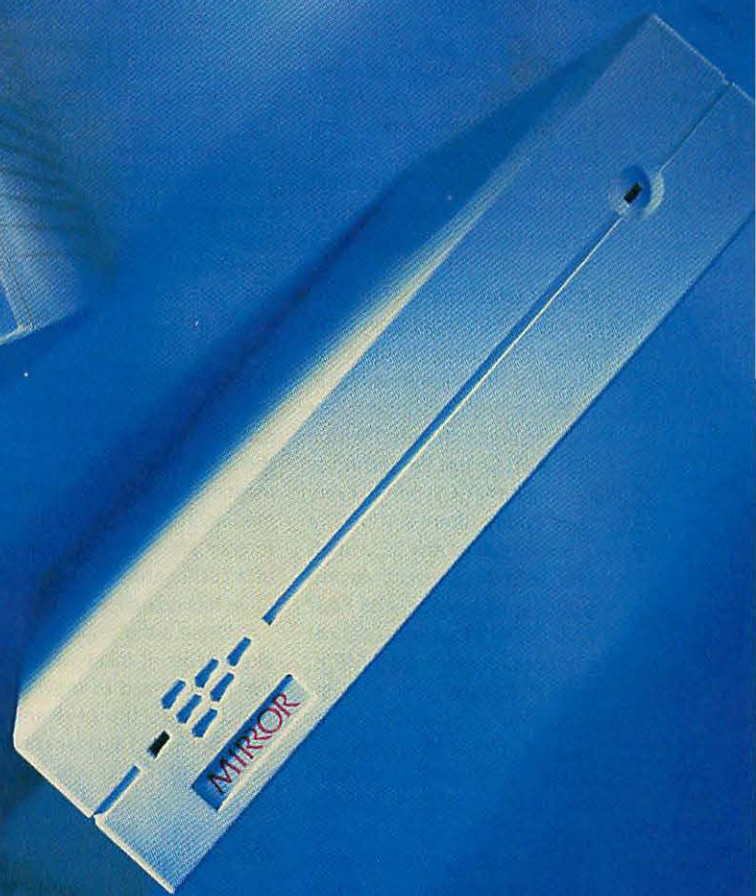
## A Drive Isn't Enough

A SCSI accelerator is a must for high-speed data transfer because out of the box your Macintosh doesn't provide optimal SCSI performance. It costs more to build a high-speed SCSI interface, particularly Fast/Wide, and since not everyone needs a high-speed SCSI interface, Apple doesn't build one into the Macintosh. (Apple does build a Fast interface into the Power Mac 8100 because those users tend to need the extra performance.)

Making the choice between the JackHammer and the SiliconExpress IV will depend on your needs. The JackHammer

by Matthew Leeds







is a less expensive card by \$200 (a 20 percent savings) and has been available for a longer period of time. But the Silicon-Express IV card generally offers a 10 to 20 percent speed advantage, according to Macworld Lab tests. Plus its 7-inch size means it fits in any Mac with a NuBus slot (the FWB card is 12 inches long).

### Evaluating Drive Options

Macworld Lab found that not only was one IBM mechanism at the top of the ranking, but it also had a substantial lead.

The DFHSS2W UltraStar mechanism consistently outperformed all other mechanisms in every test but the video throughput, where it fell behind by only 0.2 MBps. The UltraStar was the only mechanism to use both magneto-resistive heads and PRML read channel technology, and this may be the reason for its stellar performance (see the sidebar, "What Affects Drive Performance: New Technologies Push the Pace," for details). However, the UltraStar mechanism is not widely available; at press time, only Mir-

ror Technologies (612/270-2718) and MacProducts USA (512/892-4070) offered drives using it.

We found only marginal differences among most of the other Fast/Wide mechanisms. The Fujitsu, Seagate Hawk, and all the non-Fast/Wide mechanisms fell well behind all the other drives.

All the top mechanisms offered video-capture rates at or above 5 MBps, which is more than adequate for working in S-VHS or Hi8 at full-size standard frame rates. If you are working in these video

## WHAT AFFECTS DRIVE PERFORMANCE: NEW TECHNOLOGIES PUSH THE PACE

**T**op performance is achieved by a combination of factors, some inside the drive and some inside the Mac. Understanding the issues that affect performance will help you pick the best drive for your needs.

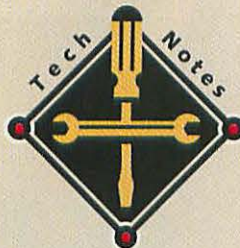
**SCSI Variations** The technology in SCSI hard drives has evolved considerably since the release of the Macintosh Plus in 1985, the first Mac (indeed, the first personal computer) with a SCSI port. So has the technology behind the SCSI port in every Mac. Today, there's SCSI-2, a faster version of the SCSI standard. SCSI-2 has several variants including Fast, Wide, and Fast/Wide. SCSI-2 Fast sends data at a maximum rate of 10 MBps, versus SCSI's original 5-MBps maximum; SCSI-2 Wide sends 16 bits of data along the bus rather than the original SCSI's (and SCSI-2 Fast's) 8 bits, which doubles the data-transfer rate; and SCSI-2 Fast/Wide does both, for a maximum transfer rate of 20 MBps, or four times that of plain SCSI-2. (No one has chosen to sell Wide-only drives; currently, all drives that implement SCSI-2 Wide also include SCSI-2 Fast.) Standard SCSI-2 (also called SCSI-2 Narrow) transfers data at a maximum rate of 5 MBps using an 8-bit channel. Drives and cards that support the SCSI-2 Fast/Wide standard usually ship with a 68-pin connector common on PCs, not the usual 50-pin Centronics connector.

SCSI continues to evolve, and companies such as Apple are investigating which aspects of this ongoing evolution to adopt (see the feature "The Future of SCSI," in this issue).

**Inside a Drive** While just moving to a Fast/Wide system can provide significant gains, there is a wide range of performance among Fast/Wide drive models. The reasons for this difference are drive delay, the use of a cache, and the use of new drive technologies.

Delay is the result of several elements. It takes some time for a drive head to move from one track to the next and to stop moving. It also takes some time for the next whole data sector to rotate into place beneath a drive head. Plus, if the data required is not in contiguous tracks, it takes even more time to move to the correct track. Finally, there is some lag in the interpretation and execution of each SCSI command sent to a drive: different drive makers achieve different levels of efficiency in writing the drive's firmware—the programs embedded in the drive's electronics that interpret the SCSI commands.

Each drive also has a cache; it's typically anywhere from 64K to 1MB. Sometimes a drive gets read requests one sector at



a time. The drive reads data from an entire track (which contains several sectors) into the cache, on the assumption that the next data request will

be on a sector from the same track (since data is written to disk in consecutive order whenever possible). If that assumption is true, the drive can immediately send the data to the Mac; if it is not true, the drive then moves the drive head to the correct location for the requested data. Similarly, the cache can be used to hold information from the Mac until the drive is ready to write the data to disk, rather than making the Mac pause the data transmission. Not all caches are equally efficient, and not all drives ship with their cache memory enabled for read and write buffering. All but one of the drives we tested had either 512K or 1MB of cache memory (the Seagate ST31200W mechanism had 256K).

The type of drive head also affects performance. Most of today's drives use magnetic thin-film technology, which relies on heads similar to the ones found in an audiocassette player. As the disk rotates under the head, it induces a minuscule electronic signal, which the head then amplifies, filters, and converts into data. But a newer type of head, called magneto-resistive,

operates on a different principle. Exposure to a magnetic field alters the resistance to electrical current in the metals used in the heads. The heads have a constant electrical current that responds to the disk's magnetic fields; the head mechanism converts the variations in current into data. Magneto-resistive heads require less power than thin-film heads, can pack bits closer together (which speeds reads and writes), and can more easily move between tracks.

Along with magneto-resistive heads, another new technology is starting to show up in drives. Partial-response, maximum-likelihood (PRML) is a digital method of reading and separating a signal from the noise on drive media. PRML uses a set of algorithms originally developed for communication with deep-space probes. With better signal discrimination comes higher bit and track densities, which improve data throughput. Also, PRML works well at lower rotational speeds, letting drive designers trade off rotational speed against bit density. Lower rotational speeds reduce noise, heat, and power consumption in drives, and may increase drive life.

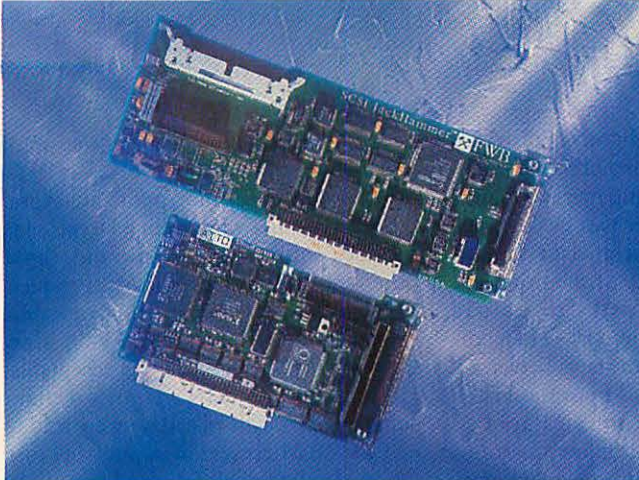
Several companies are using magneto-resistive heads and PRML signaling in smaller drives intended for laptop systems, where lower power consumption and rotational speeds are significant. Only IBM has introduced a multigigabyte hard



formats, this rate eliminates the need for a RAID Level 0 system.

Technical support is one of the biggest considerations in buying Fast/Wide drives, since the technical quality of the products is based largely on the mechanism and card makers.

In checking support and warranty, we found that of the vendors who responded to our requests for product information, both Direct Connections and Optima provided excellent technical support, FWB provided very good support, and



**High-Speed Essentials** To get maximum drive performance, you need a SCSI-2 accelerator card, either Atto Technology's faster SiliconExpress IV (bottom) or FWB's cheaper JackHammer.

drive using the two technologies: the UltraStar series.

Seagate has tried another approach to improving the sustained data-transfer rate—implementing a dual-head parallel design. By splitting the data stream into two channels and servicing each channel with a separate set of heads, the Seagate mechanism doubles the internal data rate. This is essentially a RAID Level 0 system in a

single mechanism and is found in the Seagate ST12450W, which we also tested. (See "The RAID Option," *Macworld*, April 1995, for details on RAID.)

**Inside a Macintosh** In configuring any system you must look at all the components to find potential performance bottlenecks, and the Mac offers several of its own when it comes to SCSI throughput.

When Apple introduced SCSI Manager 4.3 with the AV Macs, it added support for special SCSI-2 features, such as multiple buses, asynchronous input/output, and disconnect/reconnect. Multiple-bus support was essential for the Power Mac 8100 and also comes in handy if you add a SCSI card. Asynchronous I/O lets the OS send a request to a SCSI device for a read or a write and then continue with another process without waiting for the SCSI device to return the results of the request. With disconnect/reconnect a SCSI device that receives a command can drop off the SCSI bus to execute the command, then come back on the bus when finished. When multiple devices are on a SCSI bus, this can improve performance.

SCSI Manager 4.3 also finally enabled SCSI Direct Memory Access (DMA) on those machines whose hardware already supported it, such as the AV Macs. DMA lets data from the SCSI bus be moved directly into memory without intervention by the CPU. This can also boost performance by not slowing the preparation or interpretation of data between the Macintosh and the drive.

While System 7.5 raised the maximum size of a volume from 2GB to 4GB, it did not change the maximum size of a file (2GB) or the maximum number of files on a volume (about 65,000). While these limits may seem generous, they are not. Individual digital-video files,

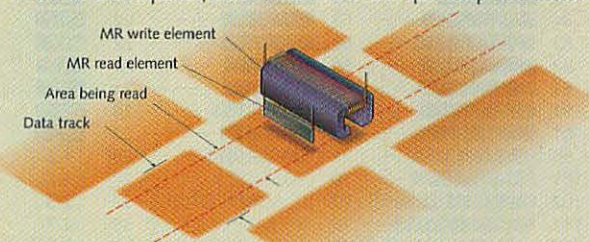
particularly when you are working with high-quality source material such as Betacam, can easily be in the gigabyte range. And with 4GB of space, it's easy to collect more than 65,000 files in one place. A short-term solution to the maximum file-count problem is to partition a large drive into more than one logical volume. All formatting software offers this function, and it's one of the first things you should consider adjusting when you buy a large hard drive.

**Formatter Effects** While the mechanism and accelerator card provide the bulk of the performance, the formatter can also make some difference. But although we did find some performance differences between drivers when drives were connected to the Macintosh Power Mac 8100/80 SCSI bus, the Macworld Lab tests showed that a third-party SCSI card was the only way to get maximum drive performance and access to Fast/Wide drives.

We tried several third-party drivers and quickly discovered that none of them deliver performance equal to each card's native driver. In addition, both the FWB and Atto cards include a utility for changing the SCSI mode pages, the parameters in each drive that control such things as enabling the drive's internal cache. This lets you fine-tune performance for your storage needs. At press time several other vendors were working on similar utilities.

## Why MR Drives Are Better

Magneto-resistive (MR) technology makes it possible to put more data on a hard drive's platter, which reduces cost and speeds up data access.



**Easier Reads** In a conventional hard drive, the read-write head is the same width as the data track, so the head must be almost exactly centered over the track to avoid misreading data. In MR heads, the read and write elements are separate structures. The write element is similar to the combination read-write head in conventional drives, but the MR head's read element is a thin conductive strip, narrower than the write element. Because the read head is narrower than the data track, it need not be centered exactly, so the drive spends less time fine-tuning the head's position.

**Denser Data** Conventional heads read data by sensing the current generated in the head's element as it passes through magnetic fields (which represent the data) on the platter. This technique requires that the head read data at a constant rate, which in turn means that data on outside tracks must be written more loosely than on inside tracks to compensate for the faster speed at which the outside tracks pass by the head. In contrast, an MR read head generates its own current and senses how the platter's magnetic fields react to it. This technique doesn't require a constant read rate so data can be placed at maximum density in all areas of the platter. The MR read head's size also helps. The smaller MR head is more sensitive to the magnetic fields and can handle more densely packed data.



both Micropolis and MicroNet provided acceptable support. For Direct Connections, the excellent rating marks a significant improvement over past evaluations. Micropolis's support technicians demonstrated little knowledge of the products, and in two of three cases tried to get us to call someone else for support. The company was barely above the cusp between a score of acceptable and poor, and then only because the technicians in two instances did answer our callers' questions after the callers wouldn't take "go elsewhere" for an answer. At MicroNet, two technicians provided quick, knowledgeable answers, but a third passed the buck

to FWB, resulting in an average score of acceptable.

We also checked support at several other companies who declined to provide product information. How did those other companies stack up? MacProducts USA (512/892-4070) was unacceptable, essentially deferring calls to FWB; Max-Concept (619/530-9062) was acceptable, although in two calls we got excellent support and in a third call we were told to call FWB; Microtech was poor because of a generally unhelpful set of responses; Mirror Technologies bordered between poor and unacceptable, since its technicians passed the buck to the SCSI accel-

erator card vendors FWB and Atto; and Tulin Technology was unacceptable because it would not help our callers.

For both sets of companies, it's interesting to note that many of them suggested calling FWB, recognizing the FWB SCSI accelerator's support for Fast/Wide drives. Also interesting was the fact that two of the five companies that provided detailed product information (Optima and MicroNet) offer only a one-year warranty, despite the fact that the original manufacturer of the drive provides a five-year warranty. Worse, Optima charges for the optional extension to its one-year warranty coverage.



## How to Get the Fastest Hard Drive Possible

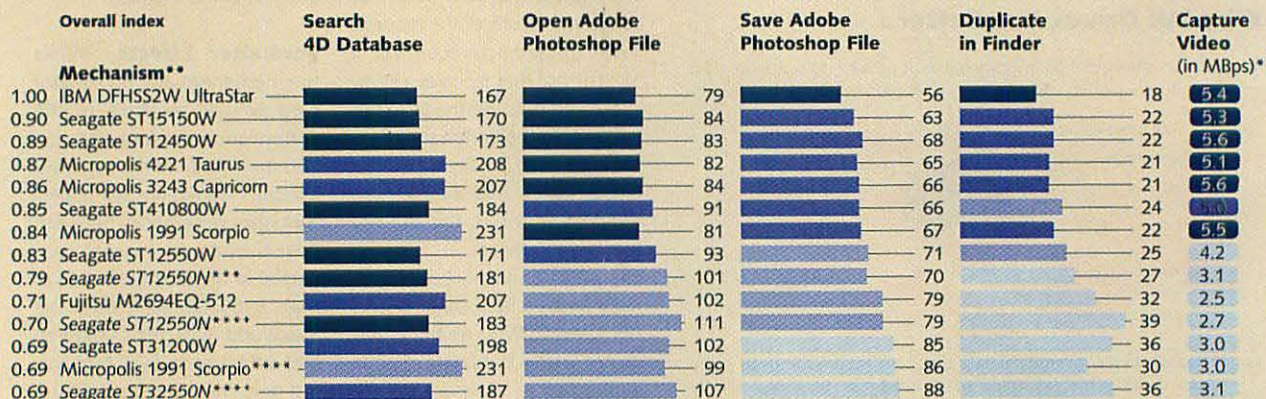
In order of overall performance from fastest to slowest. Times are in seconds. Shorter bars are better.

Italics indicate non-Fast/Wide drives tested for comparison.

Macworld Lab's tests of high-performance hard drives show the SCSI-2 Fast/Wide drives using the Atto SiliconExpress IV accelerator card to be clear winners. For comparison, we tested three SCSI-2 Fast drives on the Power Mac 8100's internal connector using CharisMac's Anubis 2.52 drive formatter. In tests of SCSI cards, Atto edged out FWB, as shown in the results of the IBM UltraStar. We also found that drivers included with SCSI cards, rather than those bundled with the drives, yield best performance: compare the Micropolis Capricorn with CharisMac Anubis and the same drive with FWB ToolKit, both on FWB's JackHammer.

Relative Speed ■ 90%–100% ■ 80%–89% ■ 70%–79% ■ 0%–69%

### IBM's UltraStar Mechanism Outperforms All Others



\*Larger number is better. \*\*Tested using the Atto SiliconExpress IV card unless noted. \*\*\*Tested using the Atto SiliconExpress IV card and a SCSI-2 Fast/Wide-to-Standard SCSI cable. \*\*\*\*SCSI-2 Fast drives tested for comparison, used with a Power Mac 8100's internal SCSI-2 Fast connector.

### For Any Drive, Atto's SCSI-2 Card Is Fastest

Results with the IBM DFHSS2W UltraStar mechanism; we had similar results with other mechanisms.



### No Matter What Drive, Formatters Don't Make a Huge Difference

Results with the Micropolis 3243 Capricorn mechanism and FWB JackHammer 1.6 card; we had similar results with other mechanisms.



#### BEHIND OUR TESTS

Macworld Lab tested high-performance hard drives using our standard suite of business and graphics applications. To show the effect of fast access, we ran an unindexed search of a 96,775-record ACI US 4th Dimension database. For an indication of data throughput, we opened and saved a 40MB file in Adobe Photoshop. To determine general performance, we duplicated a 40MB file in the Finder. For video capture,

we used a Radius VideoVision Studio to capture 30 frames per second at 640-by-480-pixel resolution with adaptive compression. The rate shown represents the best rate obtained without dropping frames on capture or playback. The Overall Index does not include video capture.—Macworld Lab testing supervised by Tim Warner



## Who Offers Fast/Wide Drives?

Company	Product	Price (List/ Company's Estimate) *	Mechanism	Capacity	Warranty (in years)	Phone	Toll-Free Phone	Technical Support
FWB	Pocket Hammer 1760 FMF-W	\$2799/\$2425	Seagate ST12450W	1.8GB	5	415/325-4392	none	very good
	Pocket Hammer 2050 FMF-W	\$2599/\$2259	Seagate ST32550W	2.1GB	5			
	Pocket Hammer 4100 FMF-W	\$3639/\$3169	Seagate ST15150W	4.1GB	5			
Direct Connections	DC 1.7 SW	\$1499/NP	Seagate ST12450W	1.7GB	5	612/937-6283	800/572-4305	excellent
	DC 2.1 CW	\$1175/NP	Conner CFP2107W	2.1GB	5			
	DC 2.1 QW	\$1095/NP	Quantum XP321140W	2.1GB	5			
	DC 2.1 SW	\$1295/NP	Seagate ST12550W	2.1GB	5			
	DC 4.2 SW	\$1745/NP	Seagate ST15150W	4.2GB	5			
	DC 4.3 CW	\$1799/NP	Conner CFP4207W	4.3GB	5			
	DC 4.3 QW	\$1795/NP	Quantum XP34300W	4.3GB	5			
	DC 9.0 SW	\$3245/NP	Seagate ST410800W	9.0GB	5			
MicroNet Technology	SBW-8670	\$5595/NP	Seagate ST410800W	8.7GB	1	714/453-6000	none	acceptable
	SSW-1800	\$2895/NP	Seagate ST12450W	1.8GB	1			
Micropolis	Capricorn 4 Model 3243W	\$2745/NP	Capricorn 4 Model 3243W	4.3GB	5	818/709-3300	800/395-3748	acceptable
	Scorpio 9 Model 1991W	\$4670/NP	Scorpio 9 Model 1991W	9.1GB	5			
	Taurus 2 Model 4221W	\$1850/NP	Taurus 2 Model 4221W	2.1GB	5			
Optima Technology	Concorde 9000W	\$5150/\$5045	Seagate ST410800W **	9.0GB	1	714/476-0515	none	excellent
	DiskKover 1800 DHW	\$2195/\$1995	Seagate ST12450W **	1.8GB	1			
	DiskKover 2100W	\$1995/\$1895	Seagate ST32550W **	2.1GB	1			
	DiskKover 4100W	\$3250/\$3175	Seagate ST15150W **	4.1GB	1			

Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessibility, helpfulness, and accuracy of the company's support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products. \* Actual prices will vary; they might be lower than the list price or higher than the estimated street price provided by the company. NP = Not provided by company. \*\* Company would not provide information on mechanisms used; mechanisms listed are based on Macworld Lab research.

It's important to note that although we list a product name and the mechanism in that product, companies often change the mechanism they use for a given product, and if you want a specific mechanism, your best bet is to ask for it directly. That's why, for example, you'll see some mechanisms in the product table, "Who Offers Fast/Wide Drives?" not tested by Macworld Lab; those mechanisms were not available at test time.

### The Last Word

Buying a hard drive these days is a little like buying any appliance: you do comparison shopping, checking out the specifications, price, and other features in an effort to get the maximum value for your money. Like computer makers, disk drive manufacturers now plan their products' life cycles to be less than a year. Within that time, the company introduces a new generation of drives, and deeply discounts what a year earlier was the top-of-the-line drive. That means you should buy the best you can now, knowing that it won't be the fastest later.

When you buy a drive, you are purchasing three things. One is the actual hardware: the drive itself, and possibly an external case to contain it. The second is the software: while most drives come preformatted these days, you should still get a formatter that installs the disk driver

and may also let you adjust the mode-page settings. But this is not a very important factor with SCSI-2 Fast/Wide drives, since you need an accelerator to use them, and the accelerators come with better-tuned formatters, as we found out in our testing. The third is customer support, which includes a warranty and technical support. Virtually all drive mechanisms larger than 1GB now come with a five-year manufacturer's warranty. Surprisingly, six of the companies we contacted offer shorter warranties for the drives they sell. When the vendor's warranty runs out before the manufacturer's warranty does (or if the vendor goes out of business or discontinues support of your drive), you may still have repair coverage from the original maker of your drive's mechanism.

Resellers often sell drives by their own brand name rather than the brand name and model number of the original producer. This can make getting the precise mechanism you want difficult.

When shopping, keep in mind that some resellers will give you a better deal if you buy the SCSI-2 accelerator and drive as a bundle than if you buy them separately.

The lesson is clear: Get the fastest drive you can afford and the fastest card you can afford. While any of the current SCSI-2 Fast/Wide options should be sufficient, you'll later appreciate having that

little extra since performance requirements never go down, only up. **m**

MATTHEW LEEDS is the technical-services manager for a large software developer.

### HIGH-PERFORMANCE DRIVE SYSTEMS



We selected the components that provide the best performance for the demanding tasks that justify the purchase of a SCSI-2 Fast/Wide drive subsystem. Performance needs outweigh the fairly small price differences in today's offerings.

#### Accelerator Card

**SiliconExpress IV** Outstanding performance and small size make this card worth the extra money. **Company:** Atto Technology. **List price:** \$995.

#### Drive Mechanism

**IBM UltraStar series** These drives offer excellent performance in a SCSI-2 Fast/Wide implementation. **Manufacturer:** IBM (available from several resellers). **Price:** Varies by reseller.



# The Future of

## SCSI HAS VEXED MAC OWNERS FOR A DECADE.

For the feature "Superfast Storage," in this issue, Macworld Lab tested the very highest-performance storage systems that are available today. But the storage landscape is likely to change significantly over the next year. Faster drive mechanisms will become available, as will faster SCSI interfaces that can keep up with the hot new drives—drives that meet the data-transfer demands of color imaging, multimedia, client/server networking, and other business needs.

These new SCSI interfaces will be available as cards that plug into Peripheral Component Interconnect (PCI) expansion slots slated to replace NuBus in the next generation of Power Macs—the NuBus slots that Macs have used since 1987 are just too slow to accommodate the newer high-throughput SCSI (see "Why PCI," *Macworld*, June 1995). There are several new implementations of SCSI on the horizon, but they all fall under one umbrella: SCSI-3. Still making the rounds of the standards committees, this latest version of the venerable SCSI standard supports the existing SCSI protocols as well as several different interface designs and data-transfer schemes. In many ways the new protocols have little in common with each other or with the SCSI buses that Macs have used since 1986—each uses different cabling and connector schemes and different data-transfer methods—but all support SCSI-3's expanded set of commands used to control disk drives and other peripherals. The SCSI-3 standards committees have taken a big-tent approach, intentionally designing the specification to support multiple implementations. Put another way, SCSI-3 is a specification that encompasses several buses.

Three of the four SCSI-3 implementations will simplify your life by eliminating the aggravation of setting address switches and adjusting terminators—the devices will configure themselves when you plug them in. SCSI-3 shatters the 7-device limit, in some cases supporting up to 127 devices on a single bus. And the devices themselves will be hot-pluggable: you won't have to shut down the Mac to install them.

The transition to SCSI-3 won't be pretty, however. There's enough jargon to choke an astronaut, and sorting out the players and the lingo is a job in itself. What's more, each protocol will become available on a different schedule; some of the most promising won't surface until the end of 1995 or later. Expect an unsettled market next year.

Finally, each protocol has its own niche: although all allow for fast data transfer, some are more likely than others to find a place in the Mac storage world. Some are likely to be used for networking as well as

# SCSI

BY JIM HEID

storage, while others will provide fast, easy methods of attaching video cameras and other multimedia gear. Thus, if you're looking for maximum performance for a specific data-transfer task, it will be important to choose the right bus for the job.

### Shifting into Serial

SCSI has always been a parallel bus—the bits that make up each byte of data travel alongside each other, each in its own wire (which you can see by looking in a SCSI connector). By comparison, the Mac's modem, printer, and ADB ports are serial buses—bits travel single-file, one behind the other. In the past, parallel buses have always been faster than serial ones, just as it's often faster to travel on a multilane freeway, which can carry more cars than a one-lane road.

But bits aren't cars and cables aren't freeways, and at a certain point, a parallel interface becomes a liability. To speed up a parallel interface you can add more wires to its cables, and you can speed up the clock that regulates the bus. But both changes increase the risk of cross talk and radio-frequency interference between wires, which limits cable lengths and requires more electrical shielding. This use of more shielding, more wires, and the bigger connectors that more wires demand increases the cost of faster parallel buses. And once the clock sur-



passes a certain speed, no reasonable amount of shielding can prevent interference.

Serial buses have fewer wires packed in side by side and are resistant to interference, even at very high clock speeds and over very long cables. It's for these reasons that three of the four SCSI-3 protocols rely on serial data-transmission techniques. Through sophisticated signaling schemes, serial SCSI protocols can blast more data through less-

Another reason Ultra SCSI warrants attention is that Quantum and Seagate, two of the biggest players in the Mac storage market, have announced Ultra SCSI mechanisms. (Hewlett-Packard has endorsed Ultra SCSI but has not yet committed to manufacturing Ultra SCSI drives.) Quantum has announced the Grand Prix XP34301, a 2.1GB mechanism, and the Grand Prix XP32151, a 4.3GB drive. Both should be shipping by the time you read this. Seagate will

## WILL THE NEW SCSI-3 END THE HASSLES?

expensive cables than can their parallel predecessors (see the diagram "What Makes SCSI-3 So Fast?").

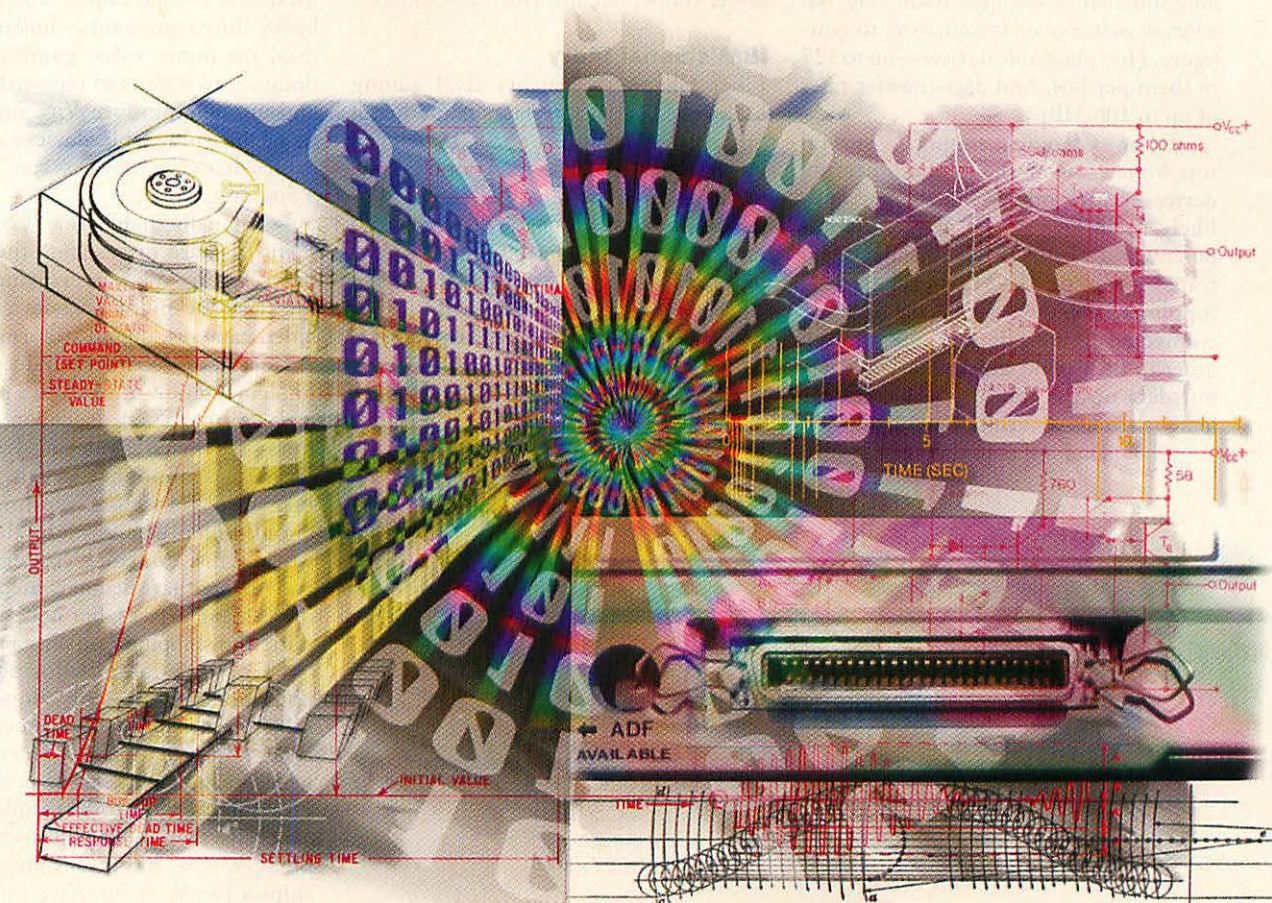
### But First, Ultra SCSI

Making the transition to serial SCSI commits hard drive and interface manufacturers to a major engineering effort. What's more, competing camps of drive manufacturers have formed around each of SCSI-3's serial SCSI protocols. While waiting for the dust to settle, some storage vendors are turning to a SCSI-3 spec that is an enhanced version of the parallel SCSI architecture, called Ultra SCSI.

By doubling the SCSI clock rate from 10MHz to 20MHz, Ultra SCSI promises a doubling of the maximum sustained-transfer rate: while SCSI-2 Fast and Wide maxes out at 20 MBps (see the feature "Superfast Storage," in this issue), Ultra SCSI supports rates of up to 40 MBps.

offer an Ultra SCSI version of its Barracuda 4, a 4.3GB drive.

The downside of Ultra SCSI is that, as a parallel bus, it does not address SCSI's finicky cabling requirements. If anything, Ultra SCSI's fast data-transfer rates make issues such as cable length and cable quality more critical. Conventional (sometimes called single-ended) Ultra SCSI cables, which have only one ground line for all the data lines, use 68-pin or 80-pin connectors and have a maximum length of 1.5m. A special data-transmission-and-cabling scheme, called differential signaling, provides a separate ground line for each data line and thus can support much longer cables. But differential signaling costs more and introduces its own installation and compatibility issues. For example, you cannot connect both differential and single-ended devices to the same SCSI bus.





## Exotic New Flavors of SCSI: What Features Do They Offer?

	Standard SCSI	SCSI-2 Fast/Wide	Ultra SCSI	Fiber Channel	FireWire	SSA
Hot-pluggable	no	no	no	yes	yes	yes
Self-terminating	no	yes	yes	yes	yes	yes
Automatic address configuration	no	no	no	yes	yes	yes
First uses	local devices	local devices	local devices	local devices, networks*	local and multimedia devices*	local devices*

\*Preliminary; may change as market develops.

### Tuned In to Fiber

The SCSI-3 protocol that's generating the most excitement in the high-end Mac storage world is Fiber Channel. While Ultra SCSI provides a solid performance boost using tried-and-true, but potentially finicky, methods, Fiber Channel promises a quantum leap in transfer rates. It does so by taking advantage of the high clock speeds that serial buses can use reliably.

Fiber Channel's name implies the use of fiber-optic cables, and indeed, the Fiber Channel standard supports them. But Fiber Channel also supports good old copper wires, including twisted-pair (telephone-like) and coaxial cabling.

Fiber Channel's promises are enticing: support for copper cables up to 100m long and fiber cables up to 10km long. No address switches or terminators to configure. Hot-pluggable devices—up to 127 of them per bus. And data-transfer rates of up to 100 MBps.

Fiber Channel supports several topologies—or methods of connecting devices to each other—but the one most likely to surface in the personal computer world is called Fiber Channel-Arbitrated Loop, or FC-AL. In the FC-AL topology, the devices on the bus are connected in a circle and talk to each other to determine which one can transmit data on the bus at a given time—hence the phrase “arbitrated loop.”

The main players in the FC-AL stor-

age market are Quantum, Seagate, and Hewlett-Packard. Quantum plans to ship Fiber Channel drives by year's end. Seagate will ship a Fiber Channel version of its Barracuda 4 drive by the time you read this, while HP anticipates delivering Fiber Channel drives by early next year.

It's worth noting that, unlike the other protocols discussed in this article (except SSA), Fiber Channel can also be used as a very fast networking medium. The Fiber Channel specification covers a variety of networking protocols and also allows for proprietary protocols such as AppleTalk. Someday you may be using Fiber Channel to access a fast hard drive and to wire a network for your office, floor, building, or campus. And that network might carry not only E-mail and server traffic, but also video and sound.

### IBM's Serial Story

Fiber Channel's primary rival among high-speed serial interfaces is the Serial Storage Architecture, or SSA. Developed by IBM, SSA provides many of the same benefits as Fiber Channel: up to 127 devices per bus, automatic device configuration, and hot-pluggability. SSA's maximum data-transfer rates are somewhat slower, however—up to 80 MBps (double-speed SSA, for 160 MBps, is in the works). SSA devices use simple 9-pin connectors and inexpensive 6-wire cables, and they usually use 2 ports, requiring a pair of cables.

SSA may become important for Windows and for minicomputer and mainframe disk arrays, but it remains to be seen how large a player SSA will be in the Macintosh world. No vendors have announced plans for a Mac version of SSA, and the main drive makers in the SSA camp—among them, IBM, Micropolis, and Conner Peripherals—have a lower profile in the high-end Mac storage world than do Seagate and Quantum.

### Apple's Fiery Wire

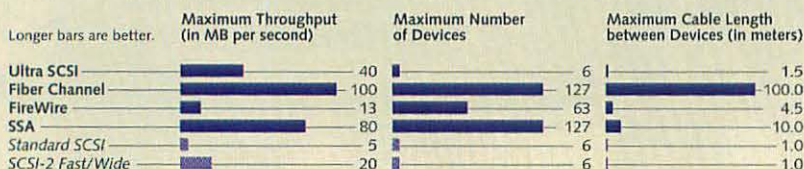
Then there's FireWire, also known by the less catchy name P1394, the preliminary specification on which FireWire is based. The initial FireWire spec allows for data-transfer rates of up to 12.5 MBps (faster versions will be available later) over inexpensive 9-pin cables. The cables use heavy-duty connectors, similar to those used on home video games, that are designed to withstand repeated plugging and unplugging. FireWire supports up to 63 hot-pluggable devices on a bus; cables between devices can be up to 4.5m long.

Originally touted as a SCSI replacement for hard drives and other storage devices, FireWire is evolving into an interface for multimedia devices such as video cameras, digital still cameras, and videocassette recorders. Indeed, Apple's implementation of FireWire places special emphasis on isochronous—real-time—data, such as video feeds and audio. (Sony has announced plans to build FireWire connectors into forthcoming digital-video cameras.) In the storage world, IBM, Maxtor, Western Digital, and Adaptec have demonstrated FireWire drives or interfaces, but none have committed to shipping FireWire products.

FireWire doesn't allow for the sizzling transfer rates or kilometer-class cable lengths of Fiber Channel, but with relatively inexpensive controllers and widespread use in consumer electronics, FireWire is likely to be simpler and less expensive than other implementations of SCSI-3. If, as has been rumored, Apple ships a FireWire interface card for PCI

## How Well Do SCSI Variants Connect?

The four variants of SCSI-3 offer different speed levels, handle different numbers of devices, and have different cable-length limits. These differences are key to understanding which technology will best fit your work environment. Unknown yet is what variants developers will ultimately offer specific products for.



\*10,000m (10km) over fiber cable. \*\*1000m (1km) over fiber cable.



## What Makes SCSI-3 So Fast?

The fundamental difference between older SCSI standards and most implementations of the new SCSI-3 is the switch from a parallel architecture (several pairs of lines carrying data side by side) to

a serial one (one pair of lines carrying data). The electronics that control and interpret data flow have become so fast that the electrical noise and cross talk created by multiple lines have become the

limiting factors on throughput; one pair of lines can operate at very high speeds with no noise, thus providing greater throughput than 8 or even 16 lines operating slowly enough to keep noise in check.

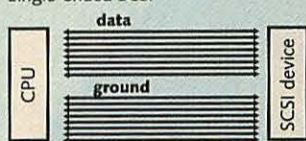
### Parallel versus Serial

A parallel interface can use lines in different ways. The standard single-ended SCSI uses eight separate data lines and ground wires (though the separate grounds function as a single wire), which makes the system especially vulnerable to noise. Another,

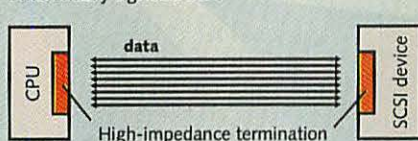
more expensive scheme, *differential signaling*, eliminates cross talk as well as any need for grounding by using high-impedance termination for the CPU and SCSI device. Each method uses additional lines for power and control signals.

A serial interface normally uses six lines—one in each direction for data, the control signal, and power.

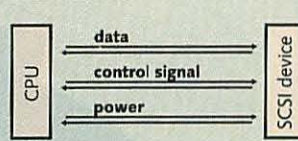
Single-ended SCSI



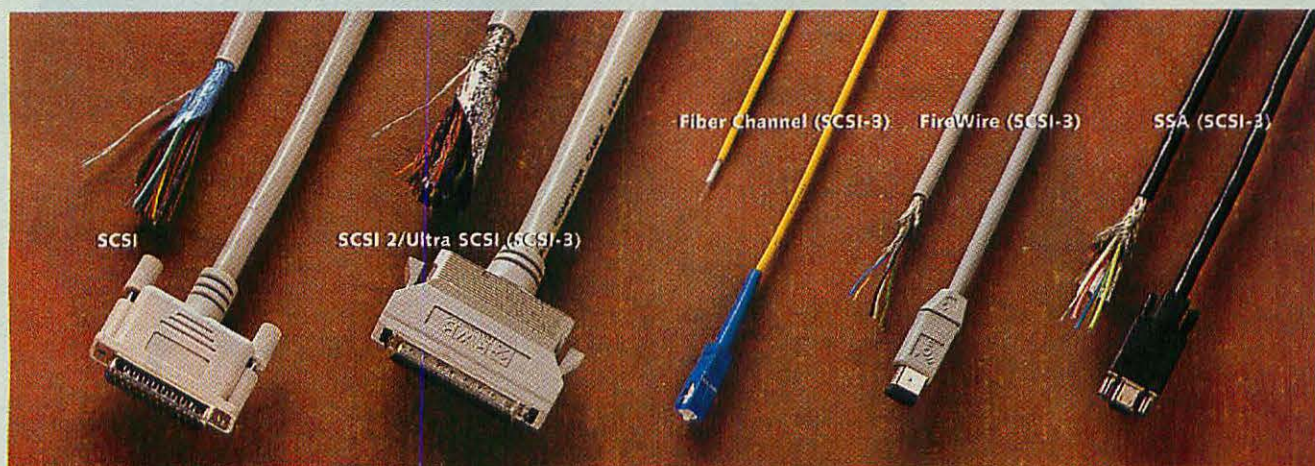
Differentially signaled SCSI



Serial SCSI



### Comparing Parallel and Serial Connectors



Standard SCSI uses a 50-pin connector, but uses only a total of 25 lines, including 8 each for data and grounding. It permits a maximum throughput of 5 MBps.

Ultra SCSI (also called Fast 20 or Fast 40) uses the same wiring scheme as SCSI-2 Fast/Wide but doubles the clock rate, boosting throughput to 40 MBps. (SCSI-2 Fast/Wide supports 32 data lines, though most implementations use only 16, with a maximum throughput of 20 MBps.) Ultra SCSI's increased noise potential limits systems that don't use high-impedance termination to using very short cables.

Fiber Channel can run over copper, twisted-pair, or fiber-optic lines, and support throughput of 100 MBps. *Arbitrated loop*, a fiber-channel topology, reduces the number of expensive host connections by sharing host interfaces among several devices.

FireWire tops out at 12.5 MBps in early implementations—fast enough for its likely use as an interface to multimedia devices. Note the easily manipulated connector, designed to be inserted and removed thousands of times.

Serial Storage Architecture (SSA) operates at 20 to 80 MBps in its first implementation, though it can achieve top speeds only with specially configured systems. SSA's topology does not require arbitration—that is, multiple devices can send packets at the same time, without making sure the line is free.

Macs and Windows machines, and if enough FireWire-equipped devices become available to make the card worth buying, then drive manufacturers might be enticed into building FireWire-based mechanisms. If not, don't expect to see FireWire affecting the storage world.

### The Last Word

In the near future, the only storage products that will be able to take full advantage of the new buses are disk arrays—today's drive mechanisms just aren't fast enough. But 20-MBps drives may soon be commonplace. With this in mind, it looks like

Ultra SCSI is the near-term option for a high-speed interface, with Fiber Channel taking the torch later this year or early next. (FWB has already announced that it will ship Ultra SCSI and Fiber Channel versions of its JackHammer interfaces and SledgeHammer arrays.)

Is it worth considering an Ultra SCSI-based system when Fiber Channel is just over the horizon? By all means—if you work in a cost- and data-intensive field, such as color publishing or video production, and need maximum performance *now*, not late this year or next year. More to the point, SCSI-2 Fast and Wide

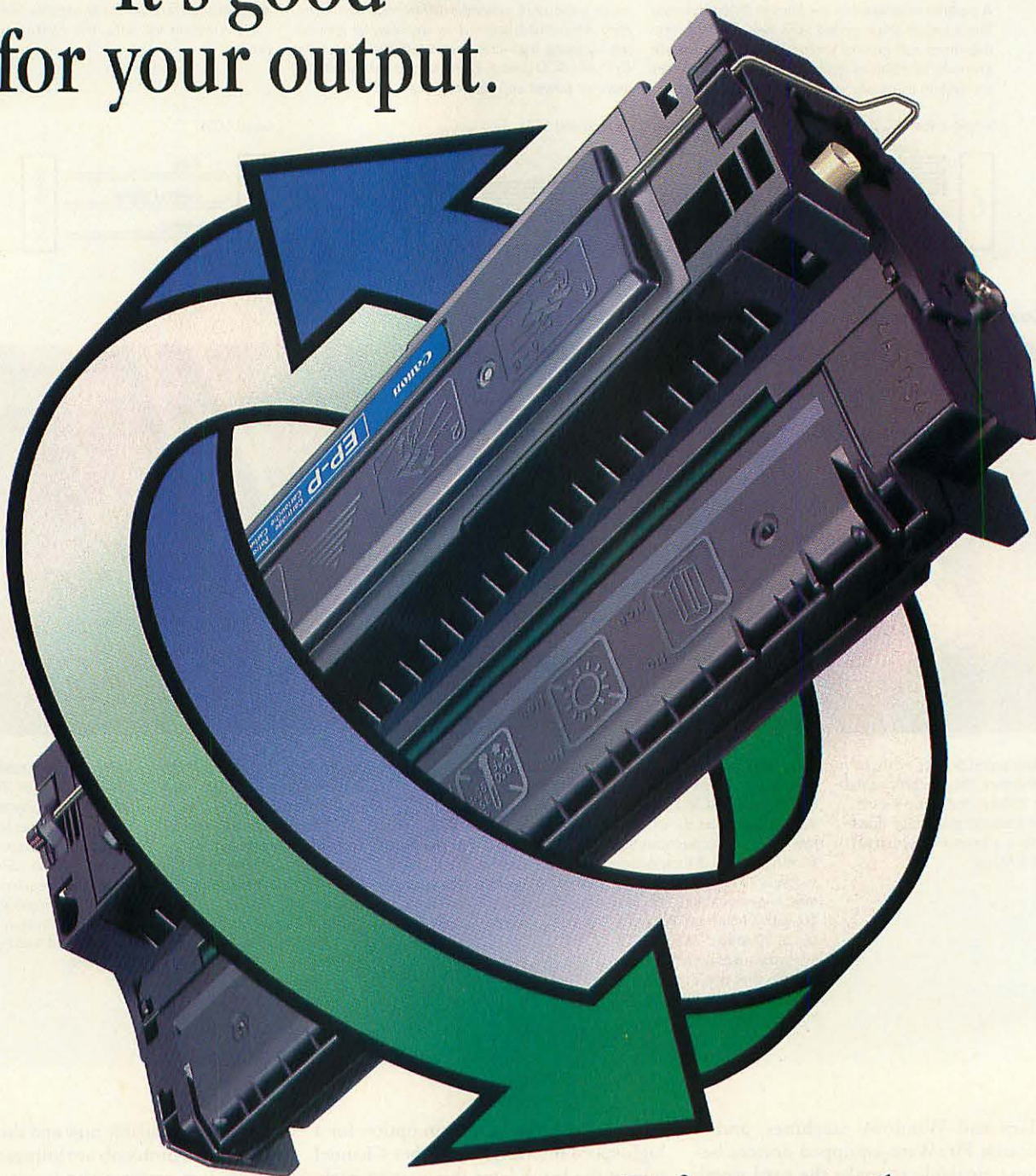
products are available now and they work. The SCSI-3 protocols are impressive, but they're just making the journey from drawing board to desktop, and that can be a long road with real potential for detours and expensive mistakes. ■

Contributing editor JIM HEID has been covering Macintosh technology since November 1983. His latest book, *Macworld Complete Mac Handbook Plus Interactive CD*, third edition (IDG Books Worldwide, 1994), recently won a BMUG Choice award for best general Macintosh book.

Research assistance by MATTHEW LEEDS.



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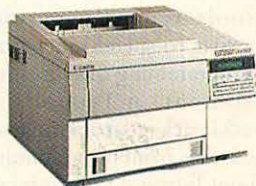
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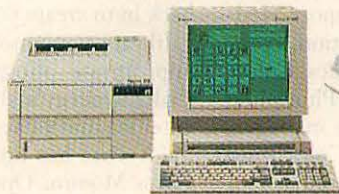
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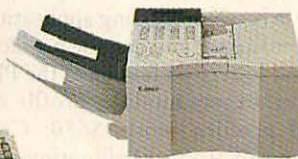
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Fax Laser Class 5000

**Canon**

Circle 109 on reader service card



# Graphics

THE LATEST IN DESIGN, PUBLISHING, AND PREPRESS

## Color Calibration in a New Light

**C**OINCIDING WITH COLORSYNC 2.0'S debut at the Seybold Conference in late March, color-calibration tools are starting to support Apple's revamped color-management architecture. Once the major graphics applications have incorporated support for ColorSync's ICC device profiles, these profiles should be able to move seamlessly between applications and platforms. Eventually, achieving color consistency across the board should become easier and more transparent to users—most of whom have been put off by the complexity and lack of industrywide consistency of color-management systems (see "The Color You Expect," *Macworld*, May 1995).

Color Solutions' ColorBlind Color Management System lets you generate customized ICC profiles of all your input and output devices—including monitors, scanners, digital cameras, Photo CDs, printers, presses, and proofing systems. Measuring scanned IT8 targets with a colorimeter, ColorBlind characterizes your devices, builds a custom profile for each, and links them together.

For \$8500, you get the complete system, consisting of X-Rite's DTP51 Autoscan Colorimeter, the ColorBlind application, an Adobe Photoshop plug-in filter, a CMYK Photoshop Export Module, a batch processing application, a profile manager, and generic profiles. ColorBlind Filters—a bundle of the Photoshop filter, export module, profile manager, and profiles—costs \$650; ColorBlind Scan (for scanner calibration only), plus the filter bundle and a generic profile for output devices is \$1300; and the batch processor sells separately for \$1000.

Candela's ColorSynergy (available from Color Partnership) is a \$495 software-only calibration package that generates ICC-compatible color profiles and lets Photoshop users export printer pro-



KEVIN CANDLAND

files created with ColorSynergy as Color Separation Tables. After scanning an IT8 target, you point to several reference marks on screen to calibrate the scanner. Next, you print out the target and scan it back in to create your printer profile. To calibrate your monitor, you select the appropriate phosphor primaries from ColorSynergy's database, or you can enter custom values if they're available.

X-Rite has introduced the X-Rite-Color Monitor Optimizer, an \$895 CIE-based colorimeter; and X-RiteColor Scanner Enhancer, software that calibrates your scanner using an IT8 target. Both products let you create customized device profiles.

Color Partnership, 800/554-8688; Color Solutions, 619/436-6593; X-Rite, 616/534-7663.—C.A.

## Multimedia for Artists



MULTIMEDIA AUTHORING tools typically require artists to spend more time programming than creating content. mTropolis, a \$3995 multimedia package from mFactory, aims to free artists from programming drudgery, without limiting their interactive ambitions. And the program's open framework allows in-house developers to easily integrate new technologies—such as improved 3-D-rendering engines and new online design tools.

Like most authoring tools, the object-oriented mTropolis lets you attach behav-



iors such as coloring and motion to specific objects in a scene and define object interactions. But you don't have to write complex scripts to do it. You can even drag and drop one object's settings onto another object.

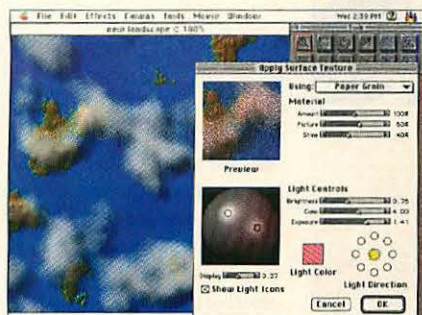
mFactory says a multithreaded kernel lets the program run on low-end machines, such as a 68020 Mac with 8MB of RAM, and allows multiple content creators to work simultaneously on the same media. mTropolis tracks a project's media and files throughout the development process and can build applications for both Mac and Windows machines.

mTropolis is expected to ship by the end of June with a smart installer for both 680X0 Macs and Power Macs. mFactory, 415/548-0600.—JIM FEELEY

## More Layers of Painter

**A**LTHOUGH FRACTAL DESIGN MANAGED to cram a slew of new features into Painter 3.0 by the time it shipped last fall, the company was forced to leave out a few things—such as multiple undo, Photoshop 3 and GIF support, and some new effects. Now 3.1, shipping in April, corrects those omissions.

Multiple undo defaults to 5 levels but can be set to as many as 32. The new Gradation Editor lets you design gradations



Among Painter 3.1's new features are a fractal generator, gradation editing, and new texture controls.

and alter existing ones. Express Texture simulates a custom halftone screen effect with built-in antialiasing, while the improved Apply Surface Texture allows for multiple light sources and greater interaction between light and paper grain.

You can now convert between Photoshop layers and Painter floaters and save GIF images for use on the Internet's World Wide Web.

The upgrade is free online to 3.0 owners (\$12.95 on disk), \$99 for X2 owners, and \$149 for 1.X and 2.0 owners. Fractal Design, 408/688-5300.—C.A.



mTropolis lets artists design multimedia content—such as assigning behaviors to these chess pieces—without doing complex scripting.

## New Life for QuickDraw GX

**B**UG-FIXES, NEW FEATURES, AND glimmers of new developer support are breathing some life into QuickDraw GX 1.1.1, part of the free System 7.5 Update 1.0 (see "System 7.5 Update Causes Conflicts," *News*, in this issue). Beyond its greater stability and faster printing, the new version of Apple's imaging engine has added features—such as EPS support and the ability to print up to 16 pages on one sheet—accessible even within non-GX-savvy applications. And though makers of publishing programs still seem put off by GX's stiff RAM requirements, bugs, and absence of cross-platform support, multimedia developers like Radius and Pixar are extolling its virtues.

Pixar says GX has enabled Typestry 2.1 users to create improved ligatures, swash caps, and other typographic embellishments. Radius uses GX to drive the title generator in its video editor, Radius-

## A Tablet You Can Roll Up

**H**AVE YOU EVER WANTED A FLEXIBLE digitizer that you could literally roll up and carry away? SummaGraphics claims the SummaFlex is the first flexible, cordless, pressure-sensitive tablet designed for graphic artists. With a soft surface that's roughly 1/4-inch thick and an active area of 18 by 24 inches, the 24-by-30-inch SummaFlex lets you switch between small and full-size work areas.

You can customize the tablet's operations by assigning them to various feature and function keys. Functions include modifying pressure output, adjusting pressure response, entering manual pressure mode, scaling tablet and screen areas, and executing macros.

## IN BRIEF

### PostScript Toolbox

TechPool Software's Transverter Pro 2.1 (\$395) lets you convert, place, and view PostScript files from any source for editing within Photoshop, FreeHand, Illustrator, or Canvas. You can convert any PostScript file to EPS and place it in QuarkXPress or PageMaker. Transverter Pro also rasterizes PostScript Level 2 files to TIFF and adds screen previews to EPS images. The upgrade from 2.0 is \$50; \$99 for 1.X users. 216/382-1234.

### High-End Masking

Scitex America has two high-end masking tools—MaskCutter (\$850, for PostScript only, due in June) and MaskCutter Pro (\$2000, for PostScript and Scitex, available now). MaskCutter automatically detects edges along a specified contour and lets you isolate areas and then add to or delete from them to mask complex objects. 617/275-5150, 800/929-9209.

Edit, making it possible to create text and graphic objects with smooth antialiasing, motion, and rotation, and to change the shape of type over time. But type developers must first build GX typefaces that RadiusEdit can manipulate. However, Apple expects more than 250 type and application developers to add GX support this year. QuickDraw GX 1.1.1 is available free online or for \$10 from Apple. 408/996-1010.—JIM FEELEY



Although SummaGraphics recommends storing the tablet flat—particularly in extreme temperatures—it can be rolled up for transporting. Due by mid-May, the SummaFlex will retail for \$849. SummaGraphics, 512/835-0900.—C.A.



# Expert Graphics

GRAPHICS PROFESSIONALS SHARE THEIR SECRETS

by Cathy Abes

**Artist:** Dorothy Krause is a professor of computer graphics at the Massachusetts College of Art and corporate curator for Iris Graphics. Her work has been featured in numerous shows, including Digital Masters, Fractal Design's Art Expo, and Adobe's Digital Art Show.

**How It Was Done:** Part of a series of images Krause calls "Transcending Reality: Wishes, Lies and Dreams," *Angel on My Shoulder* was composited from four scanned images: a Renaissance portrait; a clip-art figure; a frame; and a photograph by artist and photographer Jan Doucette.

In Photoshop 3.0, Krause used Levels to brighten the washed-out Renaissance portrait. After using Levels and Hue/Saturation to give the figure a sepia tone, Krause applied a 1-pixel Gaussian Blur to soften the edges. She then applied Unsharp Mask twice at 50 percent with a 0.5-pixel radius and 0 tolerance to restore the crisp contrast of the edges.

After pasting the clip-art angel into the Renaissance portrait and enlarging it to fit, Krause chose Darken from the Layers menu at 100 percent opacity so only the sepia remained.

Using Levels and Hue/Saturation to brighten the frame, Krause boosted the red band's saturation to +48 and reduced its lightness to -39. With the magic wand set to a tolerance of 45, she selected the areas on each side of the red band to create a ragged edge. She then painted the yellow areas bright green with the airbrush in Multiply mode. After deleting the unwanted parts, she pasted the frame into the portrait and resized it to fit.

After pasting the wood nymph into the portrait, Krause applied a KPT metallic gold blend to the original nymph, and boosted the contrast with Curves. Then she pasted that image over the unmanipulated one at 75 percent opacity using Multiply for an iridescent glow.

Finally, in Painter Krause selected the resized frame as the clone source and used the Watercolor cloner to make the frame show through the nymph's gown to make it appear transparent. **m**

**1** The original scan of the Renaissance portrait before Krause boosted the saturation and contrast by changing the input levels to 56, 1.00, and 190.



**2** The original clip-art figure (from Zedcor's Desk Gallery Clip Art Library) that would become the angel.



**3** The figure after Krause reduced Output Levels to 128 and 255 to change the black to a medium gray, then colorized it and changed the hue to 32 and the saturation to 59 to give it a sepia tone.



## THE TOOLS

**Hardware:** Quadra 700 with 20MB of RAM and a 1.3GB Seagate internal hard drive; NuDesign 200/88/44MB SyQuest removable-cartridge drive; Super-Mac 20" monitor; NEC 14" MultiSync 3D monitor; PowerUser triple-speed CD-ROM drive; HP DeskWriter 550C printer; Umax UC630 color scanner; Wacom SD-510C pressure-sensitive tablet.

**Software:** Adobe Photoshop 3.0; Fractal Design Painter 3.0; Kai's Power Tools 2.0.





**6** The original scanned photo of the wood nymph, one of a series of photographs by Jan Doucette.



**7** The wood nymph after Krause applied KPT Gradient Designer using the Metallic preset called Gentle Gold Sweep with the Procedural Blend option selected.



**4** A detail of the original frame Krause scanned, taken from a medieval illustration of an astrological sign.



**5** The frame after Krause increased the saturation and contrast by changing the input levels to 14, 1.00, and 149; changed the red band's saturation to +48 and lightness to -39; created an uneven edge; and painted the yellow areas green.



EDITED BY CAMERON CROTTY

# At Work

THE LATEST TOOLS FOR BUSINESS COMPUTING

## Getting Your Feet Wet on the Net

**T**HE INTERNET IS ALREADY THE hottest topic of 1995, and the pressure to connect your business seems almost palpable. But you don't have to spend thousands of dollars on complicated equipment and high-speed digital connections. Low-cost options abound, and some vendors are building service packages designed to hook up small and mid-size companies easily and inexpensively.

### Exploring the Territory

The best advice for any business connecting to the Internet is to start small and simple with an E-mail address—a commodity you can get for a few dollars a month from online services like America Online and CompuServe, which have easy-to-use interfaces and gentle learning curves. Many online services also have special-interest forums where businesspeople can meet and exchange ideas (**Go: Internet Forums** on CompuServe, **Jump: Your Business BB** on Prodigy).

The downside of using an online service is that none currently provide access for Mac clients to the World Wide Web, where some of the most exciting and rapid growth is occurring. If you don't mind the extra jargon, Web access is worth the slightly higher price of a dial-up connection to an Internet Service Provider (ISP) via SLIP or PPP. PSINet (703/904-4100), an ISP with a high-speed nationwide network backbone, has recently reduced its registration fee to \$9 and its hourly dial-up charges to \$1.50 for each hour over each user's 9-hour monthly allotment (plus a onetime \$50 charge for the connection software). There are hundreds of ISPs nationwide; some focus on service to local customers, while others, like PSINet, have access points in many cities. Netcom (408/983-5950) and Information Access Technologies (510/704-0160) are other well-known ISPs



WILL CROCKER

with national reach; a computer consultant near you can recommend a local service provider with Mac know-how.

If you want Internet access for several workers on a LAN but don't want the support difficulties of a full-blown in-house Net server, you should consider a hardware/service package in which an ISP handles the messy administration. The WorldWire bundle (available from Compatible Systems and InterCon) lists for \$1695 and includes a Compatible Systems MicroRouter 900i IP router, a five-user license for InterCon's TCP/Connect II version 2.1, and credit toward service on a participating ISP. You plug the MicroRouter into an Ethernet network and equip it with a modem, and everyone on your network with the appropriate client software can send and receive E-mail and access Internet services, including the

Web. Global Village (408/523-1000) provides a similar solution with its \$1995 OneWorld Internet (see *Reviews, Macworld*, June 1995). It recently reduced its connect fee to \$3.95 per hour, or a monthly flat rate of \$249 (plus a \$49-a-month E-mail service fee for ten or fewer users in either case)—competitive with online services and ISPs. As a bonus, both packages can mesh with your existing E-mail network, so sending a message across the country is nearly as simple as sending one down the hall. For more details on connecting a LAN to the Net, see "Internet Links for the LAN," in this month's *Networks* news.

### A Page of Your Own

Usually the next step is to create your own space on the Net, and the hottest place to be now is the World Wide Web. Again,



this goal can be achieved with a dial-up connection and a relatively small investment; hundreds of ISPs across the nation can set up and maintain a Web page for you. One relatively inexpensive provider is Network Wizards (415/326-2060). For a \$100 setup fee and \$30 a month, the company will maintain a Web site for you with your own domain name (for example, <http://www.yourcompany.com>). You can store up to 10MB of data on Network Wizards' server, and Net surfers can download up to 100MB of your data per month (10 people can each download 10MB, for instance); after that, you pay for every megabyte downloaded. Of course, you are just renting disk space and network time and expertise—you must provide the HTML Web page and associated files. But Web-page-design consulting is a rapidly growing industry, and if you insist on one-stop shopping, many providers also offer such services; ask a local computer consultant for a recommendation.

For those already online, NetUSA maintains a list of ISPs worldwide at <http://www.netusa.net/ISP/index.html>; Celestin offers a similar list at <http://www.teleport.com/~cci/directories/pocia/pocia.html>, while SenseMedia keeps a list of Pacific-coast providers at <http://sensemedia.net/crisp/crisp>. (See also "Web Design Spins Up," in this month's *News*.)

And this is just the beginning. You may eventually want to put in high-speed data lines and get an in-house server, especially since several companies recently announced Internet server software for the Macintosh (see "Making Macs into Internet Servers," in this month's *Net-*

*works news*). But for now, you can dip your feet into the Net without worrying about taking a bath.—C.C.

## Color Printers for Workgroups

**W**ANT TO ADD COLOR TO YOUR everyday business printing? Hewlett-Packard, QMS, and Tektronix hope so. All three have introduced printers that let you use color not only in presentations but in ordinary business documents—memos, reports, and the all-important office-party notices.

Many see HP's Color LaserJet as legitimizing the color laser category. The printer is rated at 10 pages per minute for monochrome or 2 ppm for color, but resolution is a relatively coarse 300 dpi. And it isn't cheap: it starts at \$7295; PostScript Level 2 and EtherTalk/LocalTalk options list for \$799 and \$429, respectively.

Though QMS cannot compete in name recognition, it definitely competes in price and features. Its magicolor LX color laser lists for \$4999 and includes PostScript Level 2 compatibility, an internal hard drive for font storage and network spooling, and a LocalTalk interface (add \$999 for Ethernet). QMS rates the magicolor LX at 12 ppm for monochrome and 3 to 6 ppm for color. The base model prints monochrome at 600 dpi and color at 300 dpi; equip it with 24MB of RAM to get 600-dpi color. Price and availability haven't been announced.

And now for something completely

**■ High-Res Scanning at a Low Price** Hewlett-Packard and Epson are shipping 30-bit, 600-dpi, color desktop scanners with affordable prices. HP's ScanJet 3c includes Adobe Photoshop LE 3.0 and Calera's WordScan 3.1 OCR software; it will list for \$1179. Epson's ES-1200C, which will list for \$1499, comes with Photoshop 3.0.1 and Kai's Power Tools. Epson, 310/782-0770; Hewlett-Packard, 800/752-0900.

**■ Databases Documented** An excellent summary of Mac client-server database development tools is available on the Net. Author Liam Breck briefly explains client-builder tools, data-access layers, and database servers; he also describes over 30 products in those categories. For a copy, send E-mail to [maccsdb@external.umass.edu](mailto:maccsdb@external.umass.edu), or find it on the Web at <http://www.astro.nwu.edu/lentz/mac/software/csdb-summary.html>.

different: the Phaser 340 from Tektronix. Instead of using a laser-imaging mechanism, this machine relies on crayonlike ink sticks that are easier to install and less expensive than color toner cartridges. (The tabloid-size Phaser 300i, popular in the graphics industry, uses a similar technology.) The \$4995 Phaser 340 prints up to 4 ppm in color, at 300 by 300 or 600 by 300 dpi. It includes PostScript Level 2 but only a Windows-oriented parallel port; an Ethernet interface lists for \$595.

Will businesses shell out five grand or more for a machine that prints only a few color pages per minute when 16-ppm monochrome printers are available for under \$2300? Because the new printers are essentially trying to create a whole new market, "they have a tough road ahead," says Marco Boer, an analyst at International Data Corporation (IDC). The real action in the color printer world is in the home/small-business market where, according to IDC, 650,000 Mac-compatible color ink-jets will be sold in 1995, compared with last year's 325,000.

The new workgroup color printers have definite advantages over color ink-jets in output quality and speed, but until prices fall, only deep-pocketed firms may be willing to pay the premium. Hewlett-Packard, 800/752-0900; QMS, 205/633-4300; Tektronix, 503/682-7377.—JIM HEID

## Digital Cameras for Business

**I**NDUSTRIES LIKE REAL ESTATE and insurance use point-and-shoot 35mm cameras or Polaroid-style instant cameras for documentation. Kodak and Apple are hoping that 24-bit cameras with goof-proof features, retail prices under \$1000, and savings on film and development costs will encourage businesses to get the digital picture.

The DC 40 (\$995 list), Kodak's first consumer-level digital camera, holds 48 high-res (765-by-504-pixel) images.

Users can buy extra lenses from Kodak.

Apple's QuickTake 150, an update to the QuickTake 100, holds 16 high-res (640-by-480-pixel) images and comes



with a snap-on lens/flash-diffuser attachment for close-up work. Apple estimates the price at \$749. Apple, 408/996-1010; Kodak, 716/726-7260.—C.C.



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BY JIM HEID

# Working Smart

## Making Slides with Film Recorders

GIVING A BIG PRESENTATION WITHOUT slipping up is hard enough, but using a presentation program's slide-show mode to show your visuals can put you in a minefield of banana peels. Do you schlepp your own Mac to the auditorium and risk forgetting something? If you use someone else's Mac, will the fonts you need be installed? Will the video projector work? What if your system crashes?

One tried-and-true technology eliminates these worries: trusty 35mm slides. Slides don't crash; they're more portable and less breakable than a PowerBook. Slide projectors are easier to find than obscure video-adaptor cables. And slides provide richer colors and sharper resolution than a projected Mac screen image.

Most companies use service bureaus to create slides; your presentation package probably included a brochure for a service bureau. But with a desktop film recorder, you can make your own slides (and other photographic output). Most film recorders go for \$5000 to \$6000—but given that bureaus charge between \$10 and \$30 per slide, a film recorder can pay for itself if you make a lot of slides.

I tested four film recorders for this column: Polaroid's HR 6000 Digital Palette (which is also available from GCC Technologies [617/275-5800] as the ColorFast II Plus), Lasergraphics' Personal LFR, Montage Graphics' Montage FR2, and Mirus's FilmPrinter Turbo II. To compare my slides with what the experts produce, I also sent my images to a service bureau, San Francisco's ChartMasters (415/421-6591; see the output samples in "Details of Film-Recorder Output").

### Film-Recorder Basics

Think of a film recorder as a color printer that produces images on film instead of paper. A film recorder looks like a big bread box. Facing each other inside the box are a high-resolution video tube capable of painting several thousand lines per inch, and a 35mm camera. In between is a wheel bearing red, green, and blue fil-

ters. To expose each frame, the film recorder paints three images on the video tube (one each for the slide's red, green, and blue information), rotating the filter wheel in between each one. The colored light shines through a lens onto the film loaded in the camera. After a complete exposure is made, the camera advances the film for the next shot.

Like any printer, a film recorder relies on a Chooser-based driver with its own Page Setup and Print dialog boxes. Tip: Before laying out visuals, specify 35mm slides under Page Setup; if you start with

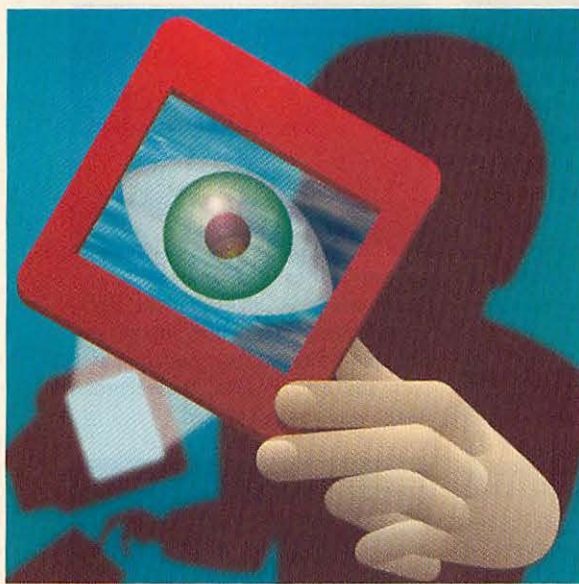
a copy-protection device, and its manual is a bit rough. But it's the only PostScript film-recorder driver around.

The drivers for Polaroid's HR 6000 Digital Palette are well designed, easy to use, and sport features other drivers lack, including sliders for adjusting the color of each exposure and a button for previewing images before exposing them. Alas, the drivers I tested, version 2.1.2, didn't work on the Power Mac 7100/80, 8100/100, or 8100/110; Polaroid says version 2.1.4, now shipping, fixes the problem.

The Mirus driver is also well designed, and version 3.0.3 runs in native mode on Power Macs. The Polaroid and Lasergraphics drivers run in emulated mode on Power Macs, and POM is also available in a native-mode version.

All the drivers I tested can batch-print a folder of images. Since it takes a few minutes to expose each image, batch-printing is very convenient.

All Mac film recorders connect via the SCSI bus. Of the four I tested, only the Polaroid provides a handy rotary switch for setting the SCSI address. The Montage and Lasergraphics



an image size corresponding to the Mac's screen or an overhead transparency, you'll probably have to rework the slides when you switch to the right dimensions.

Three of the four film recorders I tested include QuickDraw-based drivers. The Montage FR2 uses a third-party PostScript driver, Visual Business Systems' Professional Output Manager (POM), which—unlike the others—can create slides from PostScript images. (POM is also available for all units I used and many others.) POM is harder to learn than the other drivers I tested; it requires

recorders use those infernal DIP switches to set the SCSI address. And the Mirus lacks address switches; you set the address with a control panel, which may require you to disconnect other SCSI devices until the FilmPrinter is set up.

### Photo Opportunities

Although generally associated with making 35mm slides, film recorders can produce other types of photographic output, too. They accept standard 35mm film, so you can load any type of film—including

*continues*



ing black-and-white or color print film.

Some films are faster than others—they require less light to record an image. To account for this, film recorder drivers include calibration tables that let you specify the type of film you're using. You can also create your own calibration tables to accommodate your preferences or

film for which a table wasn't included.

The machines I tested all include calibration tables for Polaroid's Presentation Chrome slide film. All drivers except Polaroid's also include tables for Kodak's Elite 100 slide film. (Polaroid's driver provides a table for ISO 100 slide film without mentioning Kodak by name.) All

drivers also support several Polaroid instant slide films, including Polaroid's Presentation Chrome, which produces high-contrast images and is ideal for title slides; Polaroid's Blue, whose white-on-blue images are meant for simple title slides and line art, such as diagrams and architectural drawings; and the black-and-white Polaroid Pan.

Instant slide film requires a Polaroid AutoProcessor; this \$162 gizmo is about the size of a small telephone and develops film—no darkroom needed. Polaroid's \$52.40 Illuminated Slide Mounter simplifies mounting the developed film in standard slide mounts. Processing and mounting instant slides may sound time-consuming, but it's faster than waiting hours or days for a photofinisher. Don't expect express service from the two-hour processing joint around the corner—most offer two-hour service for print film only. For rush jobs, you may have to rely on a professional color lab.

You can replace the film recorder's 35mm camera back with a sheet-film adapter. This enables you to use professional 4-by-5-inch sheet film as well as Polaroid's 669 Instant Pack film for making instant prints—handy for proofing your visuals before exposing film. Polaroid also offers a 4-by-5-inch instant transparency film called 691 Overhead Projection Instant Pack film. With Polaroid's \$199 Overhead Enlarger, you can project these transparencies using a standard overhead projector.

### Sliding Home

Should you buy a film recorder or just use a service bureau? If you make slides only occasionally, use a bureau. The results are consistently excellent and you don't have to worry about loading film or dealing with finicky drivers.

Service bureaus can be costly, however. ChartMasters, the bureau I used, charges \$9.50 per slide for two-day service and \$32 per slide for 2-to-4-hour service. After creating less than 200 slides at \$32 each, you will have spent about what a film recorder costs. And you will probably have waited longer than if you owned a machine and used instant slide film or even rush film processing.

If you're ready to buy, I recommend the Polaroid HR 6000 Digital Palette or the Lasergraphics Personal LFR—both produced sharp, good-looking results. Of the two, I put the Polaroid in first place. **m**

Next month: Using DOS media

Contributing editor JIM HEID's *Macworld Complete Mac Handbook Plus Interactive CD*, third edition (IDG Books Worldwide, 1994), recently won the BMUG Choice award for best general Macintosh book.

## DETAILS OF FILM-RECORDER OUTPUT

These sample images produced by a service bureau and by four film recorders show a wide range in color quality, sharpness, and image accuracy. In each case I used the driver software's default settings—after all, in a crunch you might not have days to shoot several test rolls and tweak exposure settings. With enough time, color balance and exposure can be corrected, but some errors cannot.



### Polaroid HR 6000 Digital Palette

Sharpness and resolution are excellent, but the image has a yellowish cast. The background blend and the embossed S are somewhat dark, and a narrow white stroke appeared around the yellow text where *Exploring* overlaps the large blue S. The recorder also added a thin white line at the image's top and left edges (not shown).



### Mirus FilmPrinter Turbo II

This machine imaged the photograph more accurately than did the Montage and Polaroid film printers, but the blue portions of the embossed S and the background are a bit dark. Sharpness and resolution are excellent—the paired horizontal lines are clear—but a white stroke surrounds *Exploring* where it overlaps the large blue S.



**Montage FR2** The slide is somewhat washed-out, and the paired horizontal lines have merged. A white stroke surrounds the type at the bottom of the image (not shown) and the word *Exploring* where it overlaps the large blue S. The yellow is washed out where the overlap occurs. The recorded image was also crooked.



### Lasergraphics Personal LFR

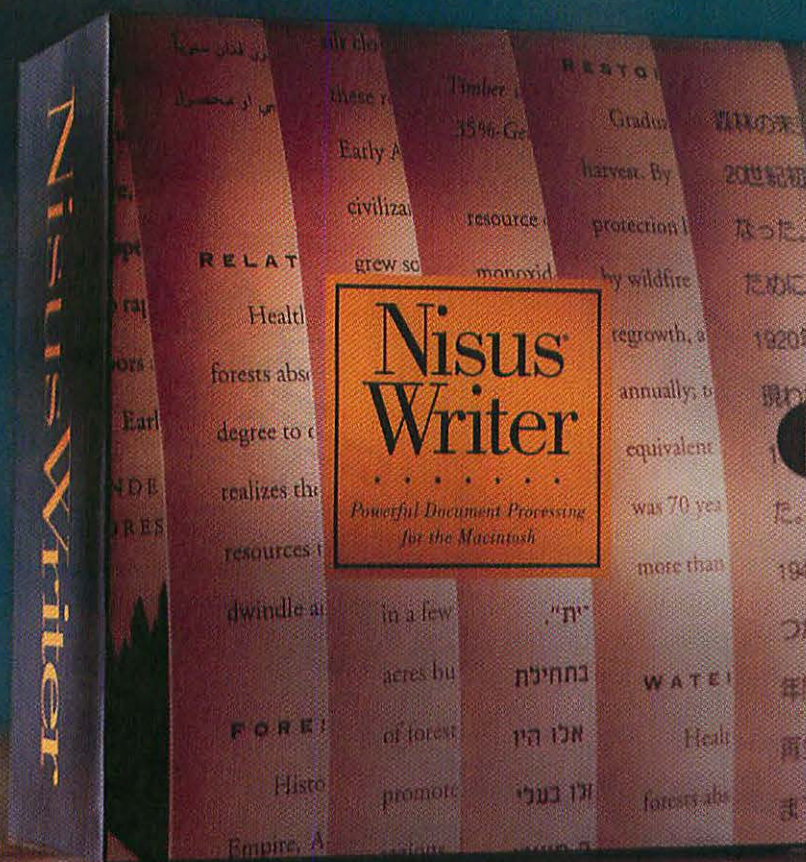
Sharpness is excellent and the background blend looks terrific, but the photograph is a bit washed out compared with the others. Also, the recorded image was slightly crooked.



**Service Bureau** The service bureau-produced slide looks great. Although the background blend and embossed S are a bit on the dark side, the image evinces none of the mysterious white knockout affecting most of the home-made slides. (Courtesy of ChartMasters, San Francisco)



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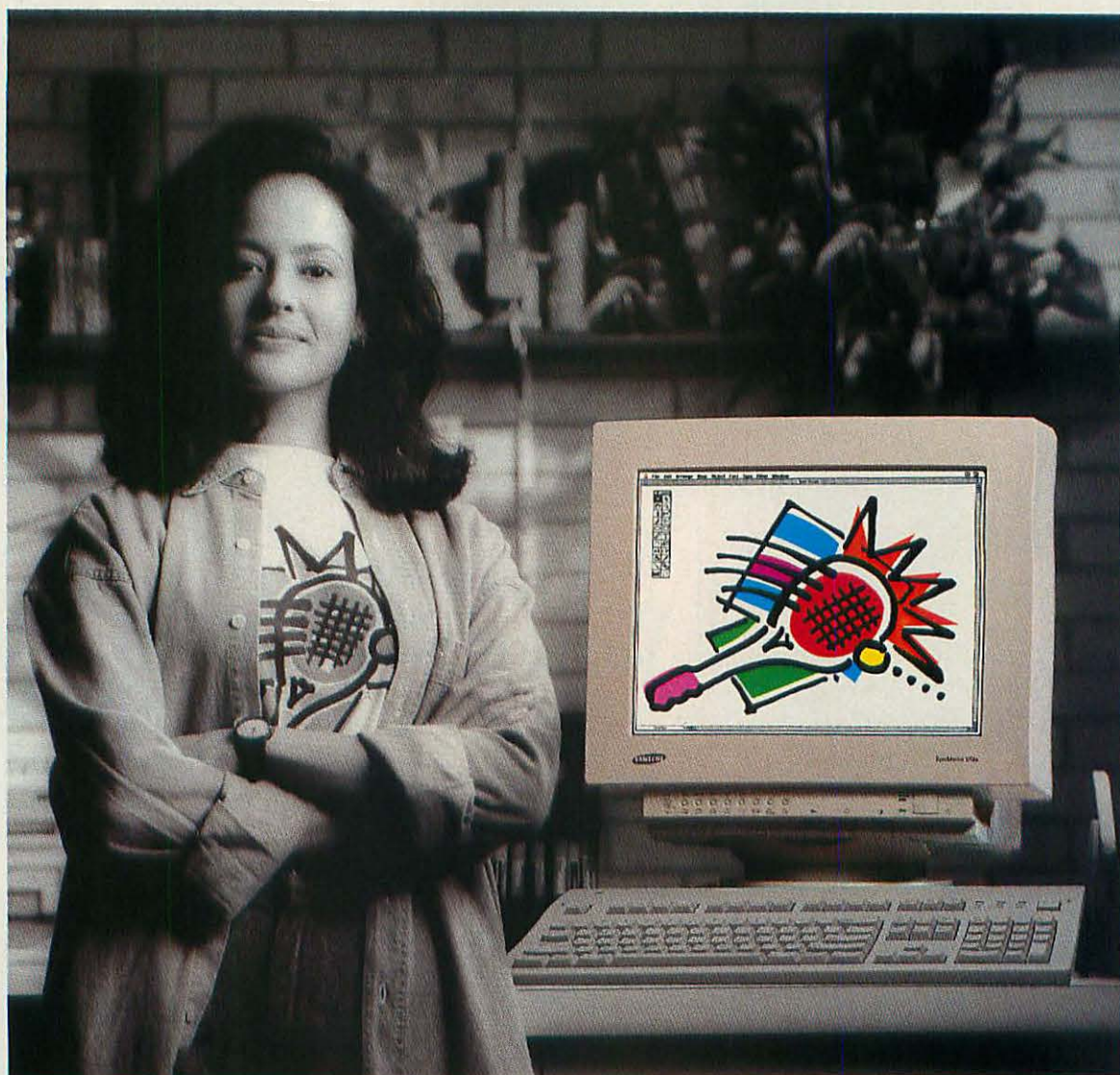
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BY LON POOLE

# Quick Tips

## Tips, Tricks, and Shortcuts

ALTHOUGH YOU CAN HAVE APPLESARE servers and System 7 file-sharing servers mounted automatically at start-up, doing so can really slow down network performance (especially if everyone on the network does it). To reduce network traffic, *Macworld's* editorial production manager, Jeff Sacilotto, suggests creating a QuickKeys macro that uses the Mounty function (a QuickKeys extension) to mount a network volume when you need it. Filling in the Mounty dialog box is easy, but you need to know the exact name of the volume to be mounted. For the best security, don't type your password in the Mounty dialog box; instead set the When Connecting option to have the macro ask for your password.

If you don't have QuickKeys, *Macworld's* associate editor Cameron Crotty suggests using aliases to mount network volumes whenever you need them. To set up the aliases, use the Chooser to mount the network volumes and make aliases. Put copies of the aliases on the desktop, in the Apple Menu Items folder, and anywhere else you want quick access to the network volumes. When you open the alias of a network volume, or drag something to the alias, your Mac automatically asks you for a password and then mounts the network volume. Similarly, you can make aliases of folders on network volumes and use those aliases to simplify accessing the original folders on the servers.

### Preventing CD Removal

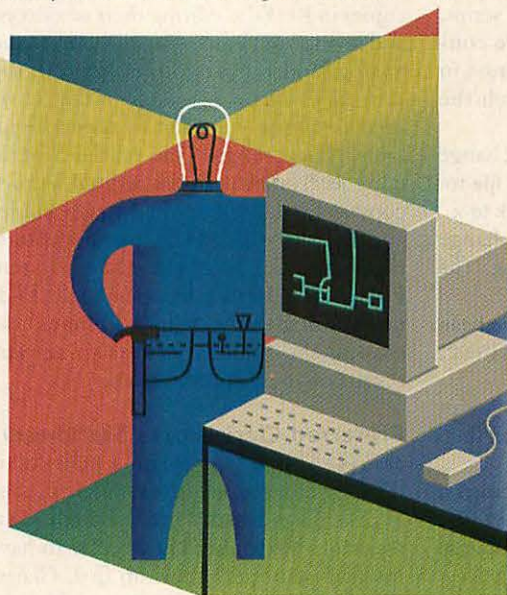
**Q** I have an expensive CD-ROM that I share with several other users. Is there some way to configure At Ease or some other security program to prevent guest users from ejecting the CD from the CD-ROM drive?

*Robert Forstot  
St. Louis, Missouri*

**A** You can deter, but not prevent, removal of a CD-ROM with System 7's file sharing. First insert the CD and then start file sharing with the Sharing Setup control panel. With file sharing on, users will not be able to eject the CD with the Finder's Put Away command, with the Eject button in an application's save or open dialog box, or by dragging the CD icon to the Trash. The CD will remain secure if it is inserted when you restart or start up after a shut-

However, anyone savvy enough to stop file sharing can easily circumvent this security scheme. You can use At Ease to deny guest access to the Finder (as described in the At Ease documentation). But At Ease alone doesn't deter CD removal; you need the file-sharing trick to thwart the Eject command that's always in At Ease's Special menu.

Two chinks in this CD armor limit its effectiveness, though they don't make it worthless. For one, poking a straightened paper clip into the tiny hole near the CD loading tray or door releases the CD despite any countermeasures you may have taken with software. You could plug the hole, but then you wouldn't be able to use it in an emergency. The other security breach occurs if someone holds down the mouse button while starting up your computer, suspending start-up. A flashing question mark appears on the screen and enables the eject button on the CD-ROM drive.



### Aliases Where You Want Them

**Q** I partitioned my Mac's 1GB hard drive to have a 100MB system volume. When I make an alias on the main volume and drag the alias to the system volume, the Finder puts a copy of the alias on the system volume and leaves the original alias on the main drive. Then I have to drag the original alias to the Trash. Is there a key I can press to make the Finder move the alias in one step?

*Craig Williams  
North Aurora, Illinois*

*continues*

down, since file sharing starts again automatically (unless you stopped it before restarting or shutting down). This file-sharing trick stops working if you install System 7.5 Update 1.0, which updates the File Sharing Extension to improve file-sharing performance and to allow ejecting CDs without turning off file sharing. To get the old behavior back, simply replace File Sharing Extension 7.6.1 (in the Extensions folder) with version 7.1.1, which comes with System 7.5.



**A** Even better: you can make an alias exactly where you want it in the first place—no bothersome copying and deleting the alias from the folder of its original item. You can add this functionality to System 7.1 or later by placing Leonard Rosenthal's freeware program AliasDragger in the Extensions folder. Then you can make an alias by pressing the control key and dragging the original item where you want an alias of it. AliasDragger and a host of other alias utilities are available from online services and user-group software libraries.

If you can't get your hands on Alias-Dragger, but you do have System 7.5, you can create an AppleScript script that makes an alias of items directly on the system volume, which AppleScript calls the startup disk. An easy way to create such a script is by modifying a script that comes with System 7.5.

1. Open System 7.5's Script Editor program (accessible via the Launcher control panel) and use it to open the script named Add Alias to Apple Menu, which is located in the Automated Tasks folder.

2. Use the **Save As** command to save a copy of the script under another name, such as **Add Alias to Startup Disk**. Leave the **Kind** option set to **Application** so the script is saved as a script application.

3. Near the beginning of the script, the line that begins `if name of` (Info contains the name of the script application in quotes). Change the name to match the name you used in step 2.

4. In the middle of the script, change the line that begins **make new alias file** to: **make new alias file at startup disk to x**

**5.** Near the end of the script, change the line that begins **display dialog** "The Alias(es) have been added to read:

display dialog "The Alias(es) have been added to the startup disk." buttons {"OK"} default button 1

6. Edit the description of the script at the top of the script window, and then save and close the script.

If you prefer to have the alias created on the desktop (which is considered part of the startup disk), simply replace **startup disk** with **desktop** in steps 2 through 5.

In the book *Danny Goodman's AppleScript Handbook*, second edition (Random House Electronic Publishing, 1994), the author includes Alias Maker, a simple script that creates aliases in whichever folder you put the script—regardless of the folder's name or location.

### Trash Replacement

**Q** Is there any way to change the icon or name of the Trash?

Bob "boB" Morriss  
Lutz, Florida

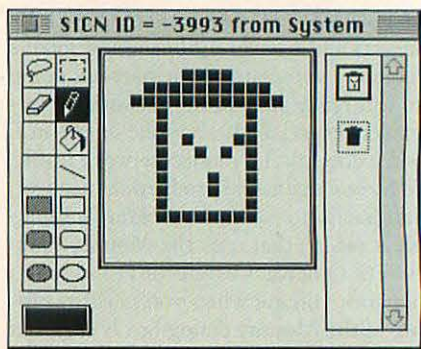
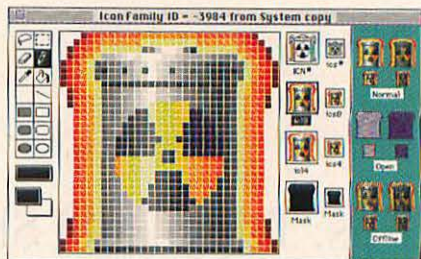
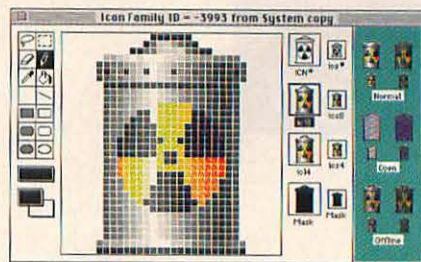
**A.** Yes, but it does involve some work. Believe it or not, there are 15 variations of the Trash icon in the System file and Finder resources (combinations of empty and full; large, small, and tiny; and many colors, few colors, and no colors), though you needn't change all of them unless you want complete consistency. The same goes for renaming the Trash: you don't have to change all 25 menu items and messages in which it is mentioned, but you may want to. You can use ResEdit, Apple's resource-editing program, either to rename and design your own Trash icons or to paste replacement icons and text you obtain from an online service or a user-group library. Few of the canned replacements include all of the icon and text resources. "Trash Makeover" details the resources you'll need to modify.

Any time you modify the System file and Finder, there's a chance your computer won't be able to start up from the usual start-up disk. As a precaution, make sure you have another start-up disk—floppy, CD, or hard drive—that you have actually used to start up your computer. As a further precaution, work on copies of the System file and Finder you've made using the Finder's Duplicate command. After opening the System and Finder copies in ResEdit, editing their resources, and saving your edits, drag the unchanged System and Finder to the desktop, the start-up disk icon, or a folder on the start-up disk in case you want to restore them later. Then rename the edited System copy as System and the edited Finder copy as Finder. Close the System Folder and make sure its icon has the special look that identifies it as the active System Folder. (If it doesn't, try opening the folder, selecting the System and Finder, and closing the folder.) Restart to see the results of your Trash surgery.

## Preferred ClarisWorks Stationery

**TIP** When you create a new document based on stationery, ClarisWorks 3.0 normally lists a bunch of its assistants by default, but I prefer to have my own stationery show up first. ClarisWorks tech support said this couldn't be done, but I stumbled onto a workaround.

Noting that the Category pop-up menu in ClarisWorks' New Document dialog box is alphabetical—General, Home, None, and Small Business—and that ClarisWorks always lists the items from the first of those categories by default, I assigned my own stationery to a new category named Acme. Sure enough, my Acme category went to the head of the Category pop-up menu, but ClarisWorks still showed the General category by



**Trash Makeover** You can give the Trash a new look with ResEdit. In the System file, edit the ICN#, icl4, icl8, ics#, ics4, and ics8 resources -3993 (top) and -3984 (middle), and the SICN resource -3993 (bottom). If you change the icons' shapes, you must also edit their masks. If you want to change the icon that appears in the upper-left corner of the Trash window, edit the Finder's SICN resource 1130. To change the name of the Trash, you need to edit the text in the System file's STR# resource -6046, items 2 and 12. For complete consistency, you also need to edit the Finder's STR# resource 5000, item 31; STR# resource 8750, item 24; STR# resource 10250, item 3; STR# resource 11500, items 17 and 19; and STR# resource 11750, all items.

default. To see my Acme category, I had to choose it from the pop-up menu.

To get my category to appear first, I opened the ClarisWorks Assistants folder (inside the Claris folder in the System Folder) and removed all the assistants that appeared in the General category. With that category empty, it just disappeared from the Category pop-up menu. My Acme category, being alphabetically first, now appears by default when I create a new document based on stationery. I suspect that the same result would follow if you edited the General assistants and assigned them to a different category.

Philip H. Mayer  
Oak Brook, Illinois



If you want to get rid of the General category but keep using the built-in assistants that are ordinarily in it, you have to change their categories. The only way I've found to do it is with ResEdit, as shown in "Changing an Assistant's Category."—L.P.

## Tricks with Label Backing Paper

**TIP** For an instant transparent label, laser-print the label image on the slick side of a piece of label backing paper. Any number of applications can create the label. For example, if you have System 7.5 you can type your label in a Stickies window, use the Page Setup command to set the paper type to Monarch Envelope, and print on a 4-by-6-inch piece of backing paper. Stick clear tape over the printed image, transfer the image to the tape by burnishing firmly, remove the tape, and apply the resulting transparent label anywhere. For example, clear tape labels make great ownership ID tags, especially if you cut a few light slits into the edges of the tape to hinder removal.

You can extend this idea to make a quick disk label from a Finder window. Set the window to a list view (such as by Name), and use the Views control panel to reduce the number of columns shown in list views. (A label has room for the name, size, and date columns, as long as you don't expand any folders in the window.) Set the paper type to Monarch Envelope and the reduction factor to 55 percent. Print the window on a disk label that you have removed from its own backing paper and stuck onto a larger piece of backing paper. If your laser printer feeds envelopes from the edge, place the disk label at the top and about 3/8 inch from the left edge of the backing paper. If your printer feeds envelopes from the center, place the disk label at the top and about 3/8 inch to the right of center.

Another variation: A mirror image printed on backing paper can be ironed onto many surfaces, such as book endpapers and fabrics.

Dick Pruitt  
Fort Worth, Texas

## No More Moiré

**TIP** As one who frequently scans printed matter (to which we or our clients own the copyright), I used to wrestle endlessly with moiré patterns. Not even my scanner's descreen function could always get rid of my headaches. Now I scan at 718 dpi (with descreening on), reduce the scan's resolution to an appropriate setting, and sharpen. This technique works like magic on originals screened at 133 lpi or higher.

For scanners without a descreen function, try the following method. After scanning at 718 dpi, apply Adobe Photo-

HDTs ID = 128 from Address List									
000000	0000	0001	0103	0080	0000000A				
000008	4E26	414C	134E	6160	NEALONam				
000010	6520	2620	4164	6472	e & Addr				
000018	6573	7320	4C69	7374	ess List				
000020	0000	0000	0000	0000	00000000				
000028	0000	0000	0747	656E	00000000				
000030	6572	616C	0000	0000	00000000				
000038	0000	0000	0000	0000	00000000				
000040	0000	0000	0000	0000	00000000				
000048	0000	0000	4054	6869	00000000				
000050	7320	4173	7369	7374	s Assist				
000058	616E	7420	7769	6C6C	ant will				
000060	2068	656C	7020	796F	help yo				
000068	7520	6372	6561	7465	u create				

HDTs ID = 128 from Address List									
000000	0000	0001	0103	0080	0000000A				
000008	4E26	414C	134E	6160	NEALONam				
000010	6520	2620	4164	6472	e & Addr				
000018	6573	7320	4C69	7374	ess List				
000020	0000	0000	0000	0000	00000000				
000028	0000	0000	0000	0000	00000000				
000030	7369	7374	616E	7473	00000000				
000038	0000	0000	0000	0000	00000000				
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**Changing an Assistant's Category** You cannot change the category of a ClarisWorks 3.0 assistant—such as Address List—with the Document Summary command. Instead, open the assistant file in ResEdit, and then open the file's HDTs resource 128. Find the word *General* in the rightmost column of the resource-editing window and select it (top).

Replace the selection by typing a different category name. If you change the length of the category name, you must enter the new length as a hexadecimal number in place of the 07 in the fourth column of the line that begins 000028. For example, changing the category name to \*Assistants (which would come last alphabetically) would require changing the name length to 0B, which is the hexadecimal equivalent of 11 (bottom).

shop's Median filter with a 2-pixel radius. Then reduce the resolution to something manageable and apply Unsharp Mask—settings of 50 percent, 3 pixels, and a threshold of 5 or above work well for me.

Eric Jones  
Staten Island, New York

Other resolutions work as well, according to Macworld's editorial production manager, Jeff Sacilotto. The trick is to scan oversize and not at an even multiple of the final resolution.—L.P. **m**

We pay from \$25 to \$100 for tips published here. Send questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to *Quick Tips*, Lon Poole, at the address listed in *How to Contact Macworld* at the front of the magazine (include your address and phone number). All published submissions become the property of *Macworld*. Due to the high volume of mail received, we're unable to provide personal responses.

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# MACWORLD EXPO

BOSTON 1995

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August 8-11, 1995

World Trade Center

Bayside Expo Center

R

EGISTER NOW AND SAVE!





## Reaching New Heights

You've been looking for the ultimate technology thrill. Products so advanced they'll take your breath away. Experts so knowledgeable they'll easily solve your toughest questions. A glimpse at the future that's more reality than virtual. MACWORLD Expo/Boston is all that and more.

You'll feel the energy the instant you step through the door. Explore the possibilities the minute you view the products and services. Begin building your future as you mix and match from the best Macintosh and complimentary technologies. And be a few steps ahead of the pack as you head back to the everyday world.

Prepare to be dazzled as the East Coast comes alive at the largest and most comprehensive Macintosh-focused event! It's all here . . . networking, spreadsheet analysis, databases, education, research, word processing, accounting, law, CAD/CAM, forecasting, design, publishing, illustration, animation, music, programming, entertainment and multimedia.



## Pre-Register Early and Save!

By registering early, you'll not only ensure your spot at this can't-miss event, you'll also save on conference and exhibit fees. Return the attached pre-registration form with your payment by June 30th and save \$30 on all conference sessions and exhibits (\$120 now vs. \$150 at the door). An Exhibits-only admission saves you \$15 (\$25 now vs. \$40 cash only at the door). All early registrants also receive their admission badge in advance. So rather than spending your time in line, you'll be spending your time with the Macintosh experts!

## SPECIAL features

### UGWUMP

(User Group Welcoming/Unwinding/Meeting Place)  
"People Networking Parlor" for user groups. Share success stories, exchange newsletters and literature. Learn how to start a user group in your area, and more!

*Sponsored by User Group Connection*

### MacSciTech Resource Center

Where engineers and scientists can meet to discuss the Macintosh in chemistry, biology, computer science, design/test engineering, physics, mathematics, and more!

*Sponsored by MacSciTech*

### Developer Central

If you're developing applications or custom solutions, you'll find the latest tools and training solutions for Macintosh and Newton development, including seminars taught by the world's best Mac techies!

*Sponsored by Apple Computer, Inc. and MacTech Magazine*

## The MACWORLD Conference Program

Whether you're using your Mac to create or control, to teach or to learn, to communicate or coordinate, to save time or save money or make money — or *all* of these — the MACWORLD Expo Conference Program puts you in touch with the Macintosh industry's latest and greatest.

Learn what's new and exciting at Apple. . . chart your own course through cyberspace. . . cash in on the latest innovations. . . share insider's tips from the savviest Macintosh users in the universe.





# The Conference PROGRAM

Here's a preview of the 12 separate conference tracks and individual sessions:

Your future at your fingertips

## A. The Design/Art/Prepress Conference.

*Celebrated artists, illustrators, designers, creators share intensely useful tips.*

Kai's Killer Tips & Tools • Digital Photography • Creative Layouts • Prepress Forum: Tested Tips, Solid Shortcuts • Broadcast-Quality Graphics • Creative Imaging • Digital Fine Art Prints • Illustrator WOW! • Photoshop WOW! • Color Prepress 2000 • Plug-In to the Plug-In Developers!

## B. The Connectivity Conference.

*How users are enhancing communications and maximizing network efficiency.*

Connect-Anywhere Networking • Essential Network Management Tools • AppleTalk Networking: Ask the Experts! • PowerTalk/PowerShare • TCP/IP • Coping with Multi-Platform Environments

## C. The Online/Internet Conference.

*Exploring the expanded dimensions, and boldly blazing new frontiers in cyberspace.*

Getting Started with Telecommunications • A Beginner's Guide to the Internet • Intermediate Internet • Building a Web Site • All About Bulletin Board Systems (BBSs) • Publishing on the Internet • Superstars of Cyberspace!

## D. The Multimedia Conference.

*Maximizing your message with exceptional-quality presentations and productions.*

Intro to Professional Desktop Video • Eye Popping Special Effects! • Masterful Insights on Interactivity • Animation Wizardry • Making Money with Multimedia • Authoring Tips and Techniques

## E. The CD-ROM Conference.

*Endless opportunities for disseminating information, combining impact with pizzazz.*

The Beginner's Guide to Publishing a CD-ROM • Marketing Your CD-ROM • Interface Design for CD-ROM Titles • Developing Interactive Games • A Quick Overview of CD-ROM Authoring Tools

## F. The Education Conference.

*Teachers report on how they've turned their Macs into extraordinary learning tools.*

Getting Started with the Mac in the Classroom • Integrating Macs into the Curriculum • Multimedia in Education • QuickTime for Educators • The Internet for Educators • HyperCard in the Classroom

## G. The Small Office/Home Office (SOHO) Conference.

*Successful small business owners share power tips for staying on top of your business.*

How to REALLY Start Your Own Business • How Macs Can Help Run Your Small Business • The Frugal Entrepreneur Markets with the Mac

## H. The Getting-Started Conference.

*Complete guidelines for those who need a concentrated lesson to get up and running.*

Design Principles for Non-Designers • How to Get Started with QuickTime • CD-ROM for Users: A Beginner's Guide • Multimedia Demystified

## I. The Advanced User Conference.

*Veteran users share their expertise and insider's tricks for maximum Macintosh power.*

Resolving System Conflicts • Customizing Your Mac • A Power User's Guide to the PowerBook • Advanced Tips and Tricks for PageMaker 5

## J. Special Interest Groups.

*Compare notes with others in a similar setting, to get advice and solve special problems.*

The Mac in Healthcare • The Mac in IS • The Mac in the Law Office • The Mac in Sci/Tech • The MACWORLD Expo User Group Extravaganza (MUSE)

## K. Application Workshops.

*Intensive training sessions by the award-winning MacAcademy staff.*

Beginning Mac • Intermediate Mac • Advanced Mac • FileMaker Pro • Excel • PageMaker • Quark Xpress • Illustrator • Photoshop • HyperCard • Director

## L. The You-Asked-For-It Conference.

*Responding to your special requests, with up-to-the-minute market developments.*

Macworld Magazine Presents: Where the Mac is Going • The MacWEEK 1995 Macintosh Product Forecast • Power Mac Update • The Complete Newton Guide • Scripting Applications with AppleScript

\*Conference tracks subject to change.

1995  
BOSTON  
WORLD EXPO

MACWORLD  
EXPOSITION



# Registration Form

Pre-register by June 30 and Save \$15 to \$30!

## 1. REGISTRATION SELECTION AND FEES

### ☐ Package One \$120

Conference Sessions and exhibits. Pre-register by June 30 (\$150 at the door).

### ☐ Package Two \$25

Admission to exhibits only. Pre-register by June 30 (\$40 cash only at the door)

### ☐ Check if Applicable

I'm an international attendee. Please ship my badge by Federal Express. Enclosed is an additional \$45.

Please choose your package and fill out the form completely. Incomplete forms will be returned. One form per person; make photocopies for additional people. Registration forms received after June 30 will be returned unprocessed. Purchase orders cannot be accepted. All registration fees are non-refundable. A \$20 fee will be charged for all returned checks. Send completed forms to: **MACWORLD Expo/Boston**

P.O. Box 4010  
Dedham, MA 02027

**U.S. Badges:** will be mailed around July 24

**International Badges:** (including Canadian) will be held on-site at the International Pre-registration counter at Bayside Expo Center.

**Badge Pickup Hours:** August 7, 11:00 a.m. - 3:00 p.m.; August 8-10, 9:00 a.m. - 6:00 p.m.; August 11, 9:00 a.m. - 4:00 p.m.

## 2. PAYMENT METHOD

☐ Check enclosed (make payable to MACWORLD Expo)

☐ Master Card

☐ Visa

☐ American Express

Amount \$ \_\_\_\_\_

Account Number \_\_\_\_\_

Exp. Date (include all numbers) \_\_\_\_\_

Card Holder Signature (Signature necessary to be valid) \_\_\_\_\_

If card holder is other than registrant, please print card holder's name below:

First Name \_\_\_\_\_ M.I. \_\_\_\_\_ Last Name \_\_\_\_\_

## 3. CUSTOMER INFORMATION

Please check one: ☐ Home Address ☐ Company Address

First Name \_\_\_\_\_ M.I. \_\_\_\_\_ Last Name \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Country (Other than U.S.) \_\_\_\_\_ Telephone \_\_\_\_\_

Fax \_\_\_\_\_

If mailing to company address: (If mailing to your home address, leave the next two lines blank).

Title \_\_\_\_\_

Company \_\_\_\_\_

## 4. ATTENDEE PROFILE

WHAT IS YOUR INDUSTRY OR PROFESSION? (Check one)

- ☐ 1. Accounting/Finance
- ☐ 2. Architecture/Construction
- ☐ 3. Art/Design/Creative Services
- ☐ 4. Arts & Entertainment
- ☐ 5. Communications/Printing/Publishing
- ☐ 6. Computer Reseller/VAR/VAD
- ☐ 7. Consulting
- ☐ 8. Corporate/General Management
- ☐ 9. Distributor/Dealer/Retailer/Service
- ☐ 10. Engineering/R&D
- ☐ 11. Government/Military
- ☐ 12. Health/Medical Services
- ☐ 13. College/University
- ☐ 14. Elementary/High School
- ☐ 15. Legal Services
- ☐ 16. Manufacturing (Computer Industry)
- ☐ 17. Manufacturing (Non-computer Industry)
- ☐ 18. Marketing/Sales/PR/Communications
- ☐ 19. Other \_\_\_\_\_
- ☐ 20. Does Not Apply

WHAT IS YOUR JOB TITLE OR FUNCTION? (Check one)

- ☐ 21. Corporate Executive (Pres./VP/CEO/Owner)
- ☐ 22. Controller/Treasurer/Accountant
- ☐ 23. DP/MIS Manager
- ☐ 24. Network Manager
- ☐ 25. Programmer/Analyst
- ☐ 26. Engineer/Scientist/R&D
- ☐ 27. Manager/Department Head
- ☐ 28. Professional (Lawyer, Doctor, etc.)
- ☐ 29. Consultant
- ☐ 30. Marketing/Sales
- ☐ 31. Educator
- ☐ 32. Art Director/Graphics
- ☐ 33. Editor/Writer
- ☐ 34. Student
- ☐ 35. Other \_\_\_\_\_
- ☐ 36. Does Not Apply

WHAT IS THE SIZE OF YOUR ORGANIZATION? (Check one)

- ☐ 37. Under 50
- ☐ 38. 50 - 99
- ☐ 39. 100 - 499
- ☐ 40. 500 - 999
- ☐ 41. 1000 & over
- ☐ 42. Does Not Apply

WHICH PERSONAL COMPUTER(S) DO YOU OWN/USE? (Check all that apply)

- ☐ 43. Macintosh Plus/SE/SE30
- ☐ 44. Macintosh Classic Series/LC Series
- ☐ 45. Macintosh Powerbook Series/Duo Series
- ☐ 46. Macintosh II Series
- ☐ 47. Macintosh Performa Series
- ☐ 48. Macintosh Centris Series
- ☐ 49. Macintosh Quadra Series
- ☐ 50. Macintosh Workgroup Series
- ☐ 51. PowerMac
- ☐ 52. IBM PC or compatible
- ☐ 53. Other \_\_\_\_\_
- ☐ 54. None

DO YOU RECOMMEND, BUY, OR APPROVE MICROCOMPUTER SOFTWARE AND/OR PERIPHERALS?

- ☐ 55. Yes
- ☐ 56. No

IF YES, PLEASE INDICATE FOR HOW MANY MACINTOSH COMPUTERS YOU HAVE THIS INVOLVEMENT.

- ☐ 57. 1-10
- ☐ 58. 11-25
- ☐ 59. 26-50
- ☐ 60. 51-100
- ☐ 61. 101-500
- ☐ 62. 501+



# Attending made easy



**U.S. Attendees:** Badges will be mailed on or about July 24. Be sure to check box indicating where badge should be sent.

**International Attendees:** International Badges (including Canadian) will be held for pick-up at the International Pre-registration counter at Bayside Expo Center. Badge pick-up hours are: August 7, 11:00 a.m. - 3:00 p.m.; August 8-10, 9:00 a.m. - 6:00 p.m.; August 11, 9:00 a.m. - 4:00 p.m. For Federal Express service, check the appropriate box on the pre-registration form and add \$45 to your pre-registration fee. Fill in your exact street address (no P.O. boxes) and include your telephone number and country code. We will Federal Express your badge directly to you.



Hotel	Single/Double	Telephone
<b>57 Park Plaza</b> 200 Stuart St., Boston, MA 02116	\$120/130	617-482-1800
<b>Back Bay Hilton</b> 40 Dalton St., Boston, MA 02115	\$155/175	617-236-1100
<b>Boston Marriott Copley</b> 110 Huntington Ave., Boston, MA 02116	\$179/179	617-236-5800
<b>Boston Marriott Long Wharf</b> 296 State St., Boston, MA 02109	\$239/259	617-227-0800
<b>Boston Park Plaza</b> 64 Arlington St., Boston, MA 02116	\$138/159	617-426-2000
<b>Colonnade Hotel</b> 120 Huntington Ave., Boston, MA 02116	\$180/200	617-424-7000
<b>Copley Plaza</b> 138 St. James Ave., Boston, MA 02116	\$188/208	617-267-5300
<b>Four Seasons Hotel</b> 200 Boylston St., Boston, MA 02116	\$266/290	617-338-4400
<b>Guest Quarters Hotel</b> 400 Soldiers Field Road, Boston, MA 02134	\$163/173	617-783-0090
<b>Harborside Hyatt</b> 101 Harborside Drive, Boston, MA 02128	\$175/195	617-568-1234
<b>Hilton at Dedham Place</b> 95 Dedham Place, Dedham, MA 02026	\$135/135	617-329-7900
<b>Holiday Inn Government Center</b> 5 Blossom St., Boston, MA 02114	\$153/169	617-742-7630
<b>Hyatt Regency Cambridge</b> 575 Memorial Drive, Cambridge, MA 02139	\$165/185	617-492-1234
<b>Le Meridien Hotel</b> 250 Franklin St., Boston, MA 02110	\$215/215	617-451-1900
<b>Lenox Hotel</b> 710 Boylston St., Boston, MA 02116	\$150/170	617-536-5300
<b>Logan Airport Hilton</b> Logan International Airport, E. Boston, MA 02128	\$140/160	617-569-9300
<b>Omni Parker House</b> 60 School St., Boston, MA 02108	\$150/170	617-227-8600
<b>Ritz-Carlton Hotel</b> 15 Arlington St., Boston, MA 02117	\$225/250	617-536-5700
<b>Royal Sonesta</b> 5 Cambridge Parkway, Cambridge, MA 02142	\$150/150	617-491-3600
<b>Sheraton Boston Hotel &amp; Towers</b> 39 Dalton St., Boston, MA 02199	\$160/175	617-236-2000
<b>Sheraton Tara Braintree</b> 37 Forbes Road, Braintree, MA 02184	\$125/125	617-848-0600
<b>Swissôtel</b> One Ave. de Lafayette, Boston, MA 02111	\$165/175	617-451-2600
<b>Tremont House</b> 275 Tremont St., Boston, MA 02116	\$119/129	617-426-1400
<b>Westin Copley</b> 10 Huntington Ave., Boston, MA 02116	\$189/209	617-262-9600



## Fly American Airlines and Save

Enjoy savings on applicable fares when you fly American Airlines, the official airline of MACWORLD Expo. American is offering attendees discounts of 5-10% on most fares. Dial 800-433-1790 to speak with an American Airlines reservationist and reference Star File #S1085AL. Savings are on applicable fares only.

## Car Rental Discounts from Alamo



Alamo Rent a Car is pleased to offer discounted rates to MACWORLD Expo attendees. To receive preferred rental rates, please contact Alamo directly at 800-732-3232 and reference Group ID #378360, Rate Code "GR" and "1G". Advance reservations are required.

## Hotel Accommodations

MACWORLD Expo has grown over the years and the demand for hotel rooms has grown too. With this in mind, we want to ensure your room is waiting for you. Attendees must make a *non-refundable deposit* for the first and last night at the time you make your reservation. If you are reserving 10 or more rooms, you must supply the hotel with a rooming list by June 26. Participating hotels in the Boston area are offering MACWORLD Expo discounts. To receive the preferred rate, call one of the hotels listed and mention you'll be attending MACWORLD Expo. There are only a limited number of rooms at the preferred rate and they sell-out quickly. Make your reservations by July 10 for the best selections (rates and availability cannot be guaranteed).

## Services for the Physically Challenged

We're committed to ensuring that our physically challenged attendees receive all the services they need to make their visit enjoyable. We offer services such as wheelchairs and interpreters for the hearing impaired. Call us at 800-945-3313 for details.

## Getting There, Once You're Here

Taking public transportation once you're in the city is highly recommended. Take the Red Line to the JFK/UMass stop, Bayside Expo will be within walking distance, or take the Red Line to South Station where you can take the free shuttle to the World Trade Center. The Complimentary MACWORLD Expo shuttle will connect you with both Expo locations.

**For more information call the MACWORLD Expo Information Hotline at 800-645-EXPO, 24 hours a day, seven days a week.**

# MACWORLD EXPOSITION

WORLD TRADE CENTER • BAYSIDE EXPO CENTER

EXHIBITS HOURS: AUG. 8-10: 10:00 A.M. - 6:00 P.M.  
AUG. 11: 10:00 A.M. - 4:00 P.M.

CONFERENCE HOURS: AUG. 8: 9:30 A.M. - 5:15 P.M.  
AUG. 9-10: 11:30 A.M. - 5:15 P.M.  
AUG. 11: 11:30 A.M. - 2:15 P.M.



EDITED BY ELIZABETH DOUGHERTY

# Networks

THE LATEST IN CONNECTIVITY AND COMMUNICATIONS

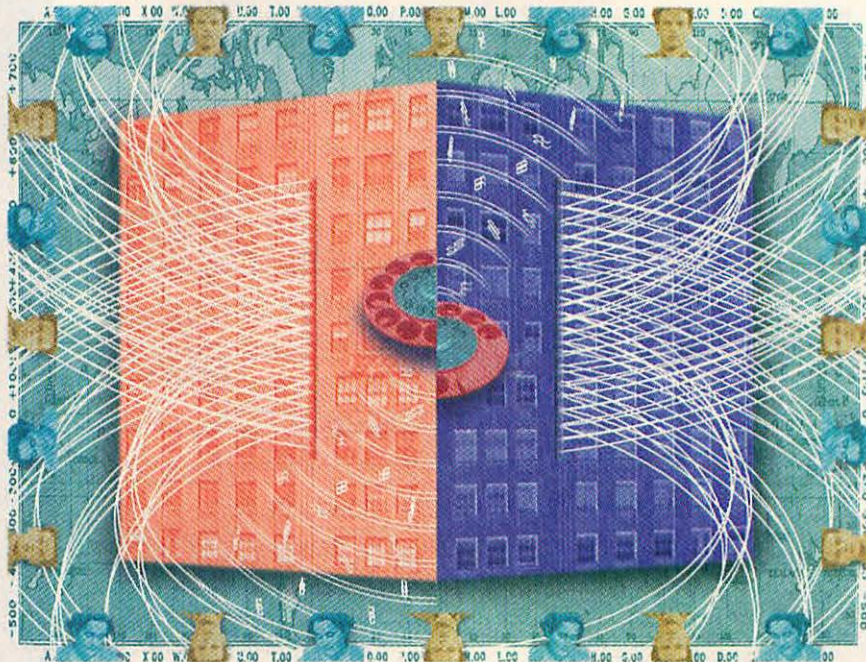
## Making Macs into Internet Servers

**P**UBLIC DOMAIN AND SHAREWARE Internet information-server software has been available for some time; the announcement of several commercial offerings and a bundled server from Apple indicate that the Mac is coming of age for businesses that want to create a presence on the Internet.

Delphic has the most ambitious design; its software, ALI Internet Server (\$995 to \$1995 list), will combine more than eight Internet server functions—including some never before available on the Mac. When it is released in the third quarter of 1995, ALI will include domain name system (DNS), simple mail transport protocol (SMTP), network news transfer protocol (NNTP), post office protocol (POP3), Gopher, World Wide Web HyperText Transfer Protocol (WWW HTTP), and Finger server software, plus mailing-list manager software—all the tools needed to build a complete, self-contained corporate Internet server and gateway, in one package.

InterCon Systems' InterServer (\$795 list), due to ship in June, will offer WWW HTTP, Gopher, and FTP services. InterServer lets Web clients access HyperText Markup Language (HTML) files, applications, and AppleScript functions running on the Mac server.

StarNine Technologies is building on its E-mail expertise by offering WebStar (formerly MachHTTP, a noncommercial HTTP server developed by BIAP Systems). Scheduled to ship in May, WebStar will cost \$269 until July 20, when it will cost \$795. It will include FTP and Gopher. In June, StarNine expects to ship two add-on WebStar products—the Commerce Toolkit, for electronic commerce support, and Security Toolkit, for client-server communications—and ListStar (\$295 for LAN E-Mail, \$795 for SMTP), an E-mail list-management and



information-dissemination tool formerly called EMail-On-Demand.

Maxum Development already offers two WebStar add-on applications: NetCloak and NetForms (each costs \$500 per server). NetCloak lets you control how your Web page looks to different users based on criteria such as browser type, password, and time of day. NetForms takes information that users enter in browser forms, formats it in HTML, and publishes it on the server, adding extras like hypertext and navigational links.

Apple is bundling the software for setting up a Web site—including WebStar; a one-user license for Netscape Communications' Netscape; AppleSearch; BBEdit, an HTML editor from BareBones Software; and Adobe Acrobat Pro—with configurations of the Apple Workgroup Server. The bundled product, called the Apple Internet Server Solution for the

World Wide Web, is scheduled to ship in May; the company's estimated prices range from \$2909 to \$8209.

Apple, 408/996-1010; Delphic, 909/792-7932; InterCon, 703/709-5500; Maxum, 708/608-9440; StarNine, 510/649-4949.—JOEL M. SNYDER

## Internet Links for the LAN

**W**HILE AN ONLINE SERVICE MIGHT be enough for an individual connecting to the Internet, to provide a business presence on the Internet really requires a direct connection.

Unlike a shared modem pool, which requires a separate telephone line for each concurrent user, a direct Internet con-



nection lets many users share a single telephone line simultaneously. A direct connection carries TCP/IP packets in an intermingled stream; a remote Internet service provider sorts out the traffic and routes it to the correct destination. Individual users can run multiple Internet client applications, allowing interactive access while batch processes, such as E-mail transfer, work in the background.

Most significant, though, a direct connection permits two-way Internet communications between any network user and another Internet user, enabling actions such as direct file transfer and videoconferencing. A direct connection also lets companies become Internet information providers via FTP, Gopher, and World Wide Web servers.

Direct Internet connections require a well-defined security policy, which could be as simple as disallowing all inbound Internet connections. A firewall—an intermediate host system between your network and the Internet—typically costs from \$5000 for home-grown versions to \$20,000 for turnkey packages that monitor and limit Internet traffic.

A direct network Internet connection has three components: a multiuser TCP/IP Internet account (called LAN IP service), a WAN-access device, and a TCP/IP router.

**LAN IP service** Internet service providers typically sell LAN IP service for a fixed monthly fee with unlimited access. The service provider charges a one-time setup fee of about \$250 to \$500. Monthly costs vary with the connection speed, from \$150 per month for 28.8-Kbps modem access to \$500 per month or more for higher-speed digital connections. For instance, PSI's nationwide 19.2-Kbps LAN-Dial service costs \$300 for start-up and \$150 per month; 64-Kbps digital service costs \$250 per month.

**WAN-access device** The WAN-access device connects your network to the telephone line. The least-expensive (and lowest-bandwidth) WAN-access device is an analog modem, which costs between \$100 and \$300 and supports speeds of 14.4 Kbps to 28.8 Kbps. Modem compression can improve overall throughput by about 50 percent.

A 56-Kbps Data Service Unit (DSU) requires a switched 56 digital data service line, which is pricey at \$100 to \$300 per month. Motorola's DA56 is a popular DSU selling for under \$300.

Fast displacing switched 56 access, Integrated Services Digital Network (ISDN) is offered in most major metropolitan areas. ISDN provides two 64-Kbps data channels, usually at less than \$100 per month. ISDN WAN devices, or

terminal adapters, range from \$599 list (under \$500, street) for 3Com Access Products' 3Com Impact digital modem to \$1695 for an Ascend Pipeline-50 router. Terminal adapters can bond the two data channels into a single 128-Kbps channel. Beyond 128 Kbps, frame-relay supports data rates up to T1 (1.544 Mbps).

**TCP/IP router** A TCP/IP router acts as an interface between your network and the WAN-access device. Ascend's Pipeline-50 series (\$995 to \$1695) combines a router with an ISDN or a frame-relay interface. Global Village's One World Internet Service bundles a router with a 28.8-Kbps modem for \$1999.

3Com Access Products, 908/721-1337; Apple, 408/996-1010; Ascend Communications, 510/814-2303; Global Village, 408/523-1000; Motorola, 205/726-0789; PSI, 703/709-0300.—MEL BECKMAN

## AppleShare and Servers Speed Up



APPLE HAS ROLLED OUT upgraded Apple Workgroup Server (AWS) models based on faster PowerPC 601 chips. The CPU in the new AWS 9150 runs at 120MHz, faster than any other Mac, and the 9150 accommodates up to five drives. The CPU in the revised AWS 8150 runs at 110MHz and in the 6150 at 66MHz. Company-estimated prices range from

**IN BRIEF**

■ **ISDN Modems** ZyXel plans to ship in May combined V.34/ISDN modems equipped with a 4MB EPROM for protocol upgrades. List prices for the 28641-series modems, which perform at up to 512 Kbps, range from \$549 to \$749. 714/693-0808.

■ **Ethernet Hardware** Linx Networks offers a mail-order line of competitively priced network equipment. 415/934-2600.

\$2549 to \$8709, depending on configuration. Each model comes in various configurations, or Apple will build to order.

On the faster servers, Apple claims that the AppleShare 4.1 upgrade runs almost twice as fast as AppleShare 4.02. On existing AWS models with slower PowerPC CPUs, Apple expects a 75 percent speedup. Apple attributes the gains to an improved desktop database cache, a larger read-ahead and write-behind cache, and a read-ahead and write-behind cache added to the client software. To take advantage of improvements, upgraded clients must be running System 7.5. The upgrade costs \$199.

Software bundled with the servers includes Wave Research's FileWave software-distribution software (see *Reviews*, in this issue). Apple, 408/996-1010.

—NANCY E. DUNN

## Slew of Remote-Access Options

**R**EMOTE-ACCESS CHOICES CONTINUE to mount, with introductions and upgrades from Dayna Communications, Shiva, 3Com, and Microcom.

Dayna is adding TCP/IP, IPX, and PPP support to its DaynaLink 2.0 Mobile Access Server, due to ship in June. The server (\$3295), based on easy-to-upgrade data/fax-modem PC Card (formerly

called PCMCIA) devices, used to support only Apple Remote Access. Upgrades for DaynaLink for ARA will cost \$595.

3Com's AccessBuilder 2000 supports protocols such as AppleTalk, TCP/IP, and IPX. Due to ship in May, the four-part version lists for \$2795.

In July, Microcom plans to ship client software for its LANexpress remote-access servers (prices start at \$3499) that will support PPP and ARAP 1.0 and 2.0.

Release 3.5 of Shiva's LanRover line includes a graphical tool for LAN-to-LAN setup and additional security functions, such as automated password expiration. Prices for LanRover, which supports ARA, TCP/IP, and IPX, start at \$2799. Upgrade kits cost \$199 to \$699.

3Com, 408/764-5000; Dayna, 801/269-7200; Microcom, 617/551-1000; Shiva, 617/252-6300.—NANCY E. DUNN

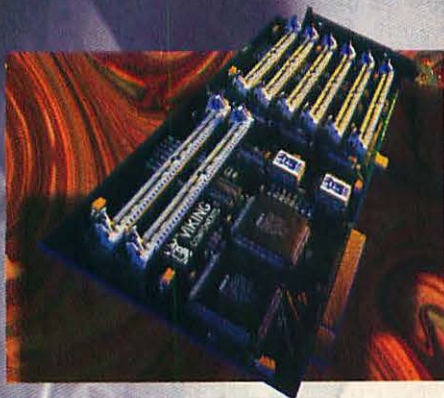


PC Card (PCMCIA) devices let you upgrade Dayna's remote-access server to support more protocols.



A word about Viking Components:

# Quality



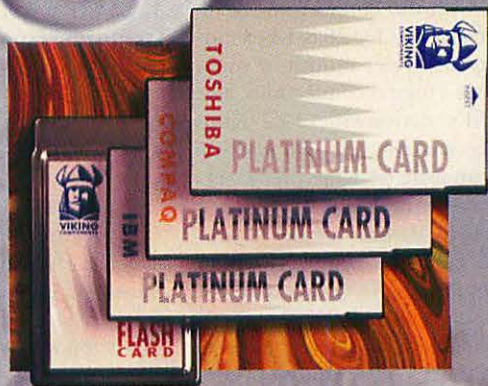
The only area we really fall short of the Stradivarius is price. (Viking memory modules cost quite a bit less.) In fact we're one of the best values you'll find in the memory business.

Modules, expansion boards, credit cards and more. Over 900 products to upgrade virtually any make and model of computer or laser printer. Call today and we can make beautiful music together.



At Viking Components we treat every memory product we manufacture like a 17th century Stradivarius. Each is intricately designed, meticulously assembled and thoroughly tested—just like the famous violin.

And like the Stradivarius, a Viking memory product is built to last a lifetime...and more. In fact every Viking product is backed by our exclusive *Lifetime Replacement & Service Warranty*, whereby we not only guarantee the part, but reimburse the dealer for service call if one should ever be necessary.



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Circle 233 on reader service card





BY CARY LU

# PowerBook Notes

## On the Road

WHEN TRAVELING WITH A POWER-Book—especially internationally—you can expect to encounter many different kinds of power plugs, power adapters, and phone plugs. Here's how to make the best use of whatever you find.

### Power Plugs and Adapters

The standard North American power plug comes in three variants—two-prong unpolarized (Apple's 100-series PowerBook AC adapters); two-prong polarized, in which one prong is wider than the other; and three-prong grounded (Duos and 500-series AC adapters). In older buildings, the wall jacks are often two-prong unpolarized. To connect with a Duo or 500-series PowerBook, you need a three-prong-to-two-prong adapter, but the adapters sold today have polarized prongs and won't fit. Some people file down the wider prong to make connection possible; they argue that for a small, well-insulated, transformer-operated power supply, the modification poses no significant hazards as long as the modified adapter isn't used for anything else. But filing down prongs defeats a safety feature, so I cannot recommend it.

Apple's AC adapters for PowerBook computers work on all standard AC power around the world, from 100V to 240V AC, 50Hz to 60Hz. You don't need to use a transformer or a voltage converter, only a suitable power-plug adapter or a replacement power cable for a Duo or 500-series AC adapter. Power-plug adapters for a specific country are widely sold in hardware and electronics stores in that country.

If you want to buy before you travel, Magellan's (805/568-5400, 800/962-4943) sells seven different plug adapters ranging from \$2.85 to \$9.85; a kit of the most common five adapters costs \$9.85, and all seven cost \$23.55. TeleAdapt (408/370-5105) sells the same adapters for \$10 each, \$50 for all seven. The Magellan's catalog and a TeleAdapt flyer list the common plug types for 150 countries;

in some countries you may run across local variations.

(A PowerBook will nevertheless work with a step-up or step-down transformer, as long as final voltage is within the 100V-to-240V limit. Do not use a PowerBook—or most electronic devices—with a lightweight voltage converter made for hair dryers and other heating devices.)



### Car-Battery Adapters

Car batteries can supply power without plug problems because cars around the world use the same cigarette-lighter connector. The common car-battery adapters work on 11V-to-14V DC sources—sufficient for 12V car batteries, which can run up to 13.8V. If you work on private aircraft or large boats, or in ambulances or industrial and military vehicles whose batteries supply 24V or 28V, look for a car-battery adapter that can run off batteries as high as 30V.

Most car-battery adapters operate a single computer type; an adapter for a Duo will not work with a 500-series PowerBook, for example. The most interesting car-battery adapter is Empire Engineering's (805/543-2816) SmartAdapter system sold by Nesco Battery

Systems (818/781-0505, 800/606-3726). Due in May, the SmartAdapter consists of a small \$74.99 SmartSupply and a \$24.99 SmartCord for your computer model. The SmartCord connects the SmartSupply to the computer and contains circuitry that sets the output voltage and current. To change computer types—the SmartAdapter can accommodate all PowerBook models and many PC compatibles—you simply change SmartCords. The SmartSupply runs off batteries producing 10V to 30V DC; SmartCords support output from 5V to 30V DC with maximum power of 25 watts, sufficient for all common laptop computers and most portable audio equipment.

The SmartAdapter system offers a way to get power on airliners. Empire is negotiating with several airlines to provide power at every first-class and business-class seat—either through a 28V power supply or with a SmartSupply built into the seat. In the first case, you'll need your own SmartSupply and SmartCord; in the second case, you'll need only a SmartCord.

I've written in the past about the 115V AC power outlet in the washrooms of most airliners. All such outlets I've tried in the past year have been disconnected—as a safety measure, according to the airlines.

### Inverter Power

Car-battery adapters produce DC power specifically for the PowerBook. An inverter is bulkier, but since it converts a car battery's 12V DC to 115V AC, it can run any AC device within its rated power. For a PowerBook, the smallest suitable inverter I've seen is the 50w, 6.5-ounce Note-power sold by Statpower Technologies (604/420-1585) for about \$40. For about \$70, the 8-ounce PocketSocket from PowerStar (408/774-6800) supplies 100w, enough for two or three portable devices. The more-common 140w inverters are

*continues*



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much larger—the size of two thick trade paperbacks stacked together—and usually sell in the \$50-to-\$100 range. Inverters typically produce a square wave or a modified stepped square wave rather than the smooth sine wave that comes out of wall outlets, but PowerBook AC adapters work fine nevertheless.

### Modem Connection

The modular RJ-11 telephone plug, ubiquitous in North America, is also found in most of the Western Hemisphere, in much of Asia, and in a few Middle Eastern countries. The rest of the world uses dozens of different phone-plug types. Major international hotels sometimes use RJ-11 plugs even if most local phones use another kind. In many countries, adapters that convert an RJ-11 plug-equipped modem to the local phone plug are sold in local hardware and electronics stores. TeleAdapt sells 36 different phone-plug adapters; a single adapter costs \$29.99, \$72 for four. TeleAdapt offers many sets of adapters for particular regions of the world; a complete set of 36 adapters sells for \$449.99. Magellan's and Global Village offer the same adapters (Magellan's sells individual adapters for \$22.50; a set of 36 costs \$495).

Aside from the plug, phone systems may use different signals to indicate dial tone, busy signal, and ringing. Some modems can handle these differences easily through country configurations stored in the modem's ROM. Recent modems using the Rockwell chip set can be configured for 18 countries with the AT\*NCn command (*n* is the country code) followed by ATZ.

A modem configured for use in the United States and Canada may refuse to dial in other countries if it does not detect a dial tone. If you cannot reconfigure, instruct the modem to ignore the dial tone ("blind dial") by issuing an ATX1 command in the modem-initialization string of your communications software. Almost all such software will let you make this change. TeleAdapt offers detailed flyers on how to do this with half a dozen popular programs. The inability to detect the busy signal is not a major problem, since you can usually hear the call's progress on the speaker. Detecting the ringing signal matters only if you set the modem to auto-answer for data or fax.

If the phone line does not respond to tone dialing, try pulse dialing. In some cases you may have to adjust the pulse duration. Check your modem's manual for the command—AT&Pn, where *n* is 0, 1, or 2. Some countries use a periodic high-pitched beep signal to time calls for billing. The TeleFilter from TeleAdapt

(\$59.99) and Magellan's (\$49.50) filters out the beeps.

Some countries have strict regulations about modems connected to the local phone system. As a practical matter, such regulations are difficult to enforce, particularly if you are simply a traveler passing through.

Using a cellular phone internationally may require a different phone in many countries; contact your cellular provider for information about international roaming. In Europe and Australia, the cellular phone system is switching over to the GSM (Groupe Speciale Mobile) digital format, which is incompatible with cellular hardware used in North America. Sending data over GSM requires a specialized PC Card (PCMCIA); standard modems won't work. For more on using modems with cellular phones, see *PowerBook Notes*, January 1995.

Many airliners now have in-flight phones with modem jacks, but the charges are high—typically \$4 for the first minute and \$2 for each additional minute—and the phones tend to be unreliable. Users report eight or ten attempts before making a successful connection.

### X rays and Metal Detectors

Should you run your PowerBook and floppy disks through X-ray inspection at airports or insist on a hand inspection? In some airports, you have no option; everything must go through X-ray screening.

Most older PowerBook manuals say not to run the computer through X-ray inspection, but they're wrong. (Current Apple manuals make no clear recommendation.) X rays won't damage computers or magnetic media and neither will the motors for the conveyor belt that runs through the X-ray machine and metal detectors. There are only two dangers at a security checkpoint—having your computer dropped or stolen.

### Lighting the Keyboard

If you often work in dark places—such as in a car's passenger seat or in an airplane with the overhead light off so those nearby can sleep—a keyboard light may come in handy. ASF Associates (516/868-3638, 800/771-3600) sells the NCL4 80, a small \$39.95 light that clips on top of a laptop's screen. It comes with four rechargeable AA cells, an AC adapter/charger, and a carrying case; the total traveling weight is 14 ounces. For two hours on a charge, it lights the keyboard as well as papers next to the computer. ■

CARY LU is a *Macworld* contributing editor who covers mobile- and remote-computing issues in this monthly column.





# Gotta CD Doctor?

*Medical discs to make you a more knowledgeable patient*

**T**ODAY'S MEDICINE SURE ISN'T what it used to be. Hey listen, when I was a kid, eggs were good for you, alcohol wasn't, and the "national health-care debate" was whether or not girls had cooties.

Today, you've got HMOs, you've got CT scans, and even so much as *thinking* about a hospital carries a \$900 deductible. Well, the Macintosh has solved all our other problems, so why can't it help us through the murk of modern medicine? Why doesn't somebody plug all the symptoms and diseases into a smart, snappy, self-help CD-ROM database? Why couldn't such a program explain a problem with video, animations, and a musical sound track? (How many real doctors do that?) In fact, why doesn't Congress issue every American a Power Mac 8100, let us research our own problems, and shave billions off our national health-care tab?

As far as I can tell, there's only one thing standing between that scenario and reality: the difficulty of getting great doctors and great multimedia programmers together. As you'll see, such a collaboration seems to be as hard to find as a cure for the common cold.

## Mayo Clinic Family Health Book

Talk about electronic books! This CD-ROM (\$59.95; IVI Publishing, 612/996-6000, 800/432-1332) is closely based on the hardbound volume of the same name. Both give you an accurate, authoritative, and complete text that captures a snapshot of modern medical thinking: infant care, exercise, diet, AIDS, the health-care system, death and dying, and so on. The writing is spectacular, the advice is careful and sound, and the information is up-to-date and interesting.

Actually, maybe the conversion from book to disc was *too* faithful. There's not much to do here besides reading. True enough, little icons appear in the text, indicating that one click will make a diagram appear. But they appear far too infrequently; in the entire CD, there are only 45 animations (all short and simple—

only 3 are QuickTime movies). Perhaps the best evidence that the programmers have left the *multi* out of multimedia is that the compact disc itself is two-thirds empty. Fill 'er up!

The act of reading this magnificent prose isn't pure pleasure, either. All you get is 12-point Geneva; you can't resize the window (too bad for the anatomy feature); and the scroll bar doesn't change screens properly—when you page down, the last line you read becomes the *third* line of the new screen.

But to be fair, virtually every other detail of this disc was done right. The Search command works beautifully. Navigation is clean and simple. There's a refreshing freedom from the usual

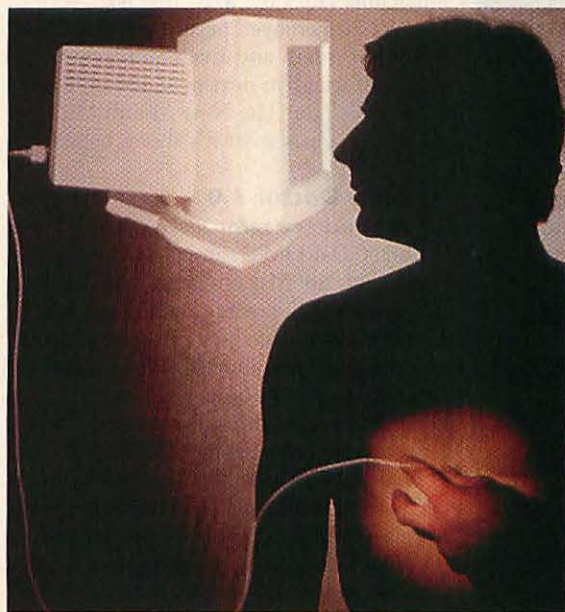
fied is the *Mayo Clinic Heart Book*. Sure enough, the entire disc concerns that one particular muscle: its anatomy, its diseases, surgery, tests, emergency care, a drug directory, and so on. Once again, the text is impeccably edited and painstakingly user-friendly; once again, simple diagrams and short animations occasionally appear.

Actually, you may well learn more from this disc than from Family Health Book. That more general disc covers plenty of stuff everybody already knows—the evils of smoking, the benefits of a low-fat diet, and so on. The Total Heart, on the other hand, delves deeper into a more focused topic and yields some surprising information: on women and heart disease, on the history of cardiology, or a blow-by-blow description of what to expect when you go in for heart surgery.

## A.D.A.M. The Inside Story

It's like something out of "Star Trek": as you drag the scroll bar downward, successive layers of the subject's body melt away. Skin, fat, muscle, organs, bones—layer by layer, until the bones themselves have been eaten half away.

Fortunately, the subjects are Adam and Eve, the cheerful, full-color hosts of this amazingly informative CD-ROM (\$49.95; A.D.A.M. Software, 404/



screaming "FOR ENTERTAINMENT PURPOSES ONLY" disclaimers. The prices of the book and CD-ROM are \$20 apart; which one to buy otherwise boils down to choosing the surface you prefer reading from.

## Mayo Clinic—The Total Heart

As you can imagine, this CD-ROM is nearly identical to the Family Health Book in design and format (\$34.95; IVI Publishing). In this case, however, the real-world book that has been electroni-

980-0888, 800/408-2326). You choose the view (front or back), the gender, and one of four popular skin colors; that amazing scroll bar does the rest. At any time during your virtual dissection session, you can click on a body part or organ to read its medical or colloquial name ("clavicle [collarbone]"). The viewing area can be as large as your monitor, although most people will wind up moving the currently displayed body-part rectangle up or down as needed.

*continues*



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## THE DESKTOP CRITIC

If A.D.A.M. were nothing more than an electronic cadaver, you could still spend hours with it, learning something new and amazing every ten seconds. Indeed, fancier (and much more expensive) versions of this same program—showing more angles, more layers, and more scientific terminology—are sold to doctors and med students. This home version, however, comes with its own exclusive feature: 50 narrated, beautifully animated slide shows. They cover, for example, the 12 major body systems, narrated by Adam and Eve with laugh-out-loud corniness. (The humor usually comes at poor Adam's expense; for example, the concept of pain is illustrated by a beesting on his nose.)

OK, OK, this isn't the program to consult when you think there's something wrong with you. And the intellectual level won't satisfy the local Mensa members. But you'd be hard-pressed to unearth a clearer, better illustrated, more entertaining way to learn about your *other* favorite machine (after the Mac, that is).

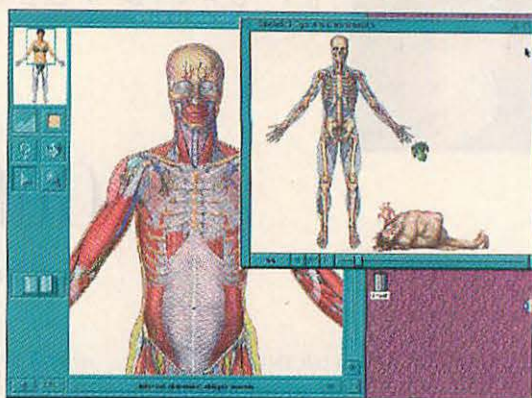
(I also enjoyed perusing a prerelease copy of Adam and Eve's similarly witty and informative next production, a new CD called the *The Nine Month Miracle*. Can you guess what it's about, baby?)

### Family Doctor 3.0

Ever hear the term *shovelware*? That's when CD-ROM creators, petrified by the yawning 600MB emptiness of the disc they must fill, resort to piling pounds of previously published product onto it, without terribly much concern about its quality or integration.

The meat of this disc is composed of newspaper columns by Allan Bruckheim, M.D. (\$29.99 company's estimated price; Creative Multimedia, 503/241-4351). Unfortunately, that means you get phrases like "Exercises are very difficult to prescribe in this column, without the drawings." Um, Dr. Bruckheim? This is multimedia. If you can't illustrate an exercise here, then it can't be done.

Dr. Bruckheim's writings have other problems, too, especially grammatical errors and a tendency to simplify medical matters for his newspaper audience. Nor are the programmers of this disc what you'd call perfectionists, either. They chose HyperCard as the basis of the program, which makes everything nice and slow. Some icon buttons and menu commands don't work; you can't bring a text window forward to read it (the search-



**Call Him Spineless** In the larger A.D.A.M. window, you can see Eve in partial body-part undress. In the smaller window, a QuickTime movie demonstrates what happens to Adam when his skeleton is removed. (The movie gets less silly after the opening joke.)

results window floats stubbornly on top; and the 300 illustrations are dumped in a folder, with no links to the articles (or anything else).

Of course, this disc offers other stuff to do besides reading old newspaper columns. There's a pretty good (but small and nonresizable) anatomy window, vaguely reminiscent of A.D.A.M.; a guide to drugs (listed by chemical name, not brand name); and, inexplicably, a guide to 900 rare diseases (with no corresponding database of common ones). Trouble is, each of these databases was provided by a different company, and there are no links from one to another. You feel less like you're visiting the family doctor, and more like you're rooting through arbitrary folders in his file cabinet. Both the company and I have high hopes for the improvements slated for the new version due in October 1995.

### HouseCall 1.5

Of the programs I reviewed, only one took the tack I thought all would take: a medical database. You tell it your symptoms, and it tells you what ailments you might have, ranked by likelihood. Click on another button, get told more about it.

That's the heart of HouseCall (\$89.95; Applied Medical Informatics, 801/464-6200). This isn't a CD-ROM, although it does consume 12 megs of your hard drive. And there are no videos or narrators, either; this program is pure text, spiced up by drawings here and there. In addition to the automatic-diagnosis feature, HouseCall also tells you about unexpected interactions between drugs, what each medical test costs and feels like, what to do in the event of poisoning, and so on. The program is simple to use, plenty quick, and sharp-looking.

The problem, of course, is that a computer program can't possibly ask the right questions, nor poke you in the prop-



er places, to arrive at an accurate diagnosis; doctors devote decades learning to do that. And sure enough, this program makes a few mistakes, according to a doctor who checked it out with me. Ironically, that's another problem: the program is frantically self-aware of its own fallibility. You endure its disclaimers everywhere, most annoyingly before you're permitted to see the results of each symptom analysis.

Nonetheless, I'm a lot happier facing life with information on those 1250 diseases at my fingertips than without it. Sure, I might irk some doctor someday by blurting out some piece of erroneous wisdom provided by this program. But hey, what're second opinions for?

### Anatomist 2.2

For a CD-ROM on the market in 1995, it's a little weird that its 400 drawings (of 2500 body parts) are all in black and white. Furthermore, this program is, alas, built upon the sluggish HyperCard. Without QuickTime movies and corny jokes by dueling hosts, how can it hope to compete with, for example, A.D.A.M.?

Well, for one thing, Anatomist is aimed at college-level anatomy students, not the family of four gathered around the Performa (\$295; Folkstone Design, 604/886-4502). For another, its flash card-like interface permits molecular, cross-section, and interior views of bodily structures, which are beyond the scope of A.D.A.M. Another plus: you get to hear every anatomical term pronounced. If you wish, a little information window floats above the drawing, describing the element you've just clicked on.

And speaking of flash cards: no body part is identified until you click on it, making Anatomist an ideal study tool. Boy, do I wish I'd had this thing in college. And boy, do I wish they'd add color.

### The Upshot

With so much changing so fast in modern medicine, the CD-ROM isn't such a bad format for keeping up, 600MB at a time. The healthiest choices are the authoritative Family Health Book, the ingenious and entertaining A.D.A.M., and the hypochondriac's ultimate fantasy, HouseCall.

Actually, my mind was somewhat blown by these programs—1250 diseases? And 2500 body parts? Man, I'm amazed we function at all. **m**

Contributing editor DAVID POGUE wrote the Macintosh best-seller *Macs for Dummies*, third edition (IDG Books Worldwide, 1995). At Yale, he was premed until about 20 minutes into his first organic-chemistry class.

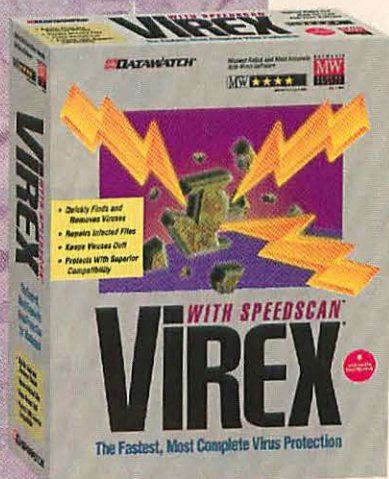
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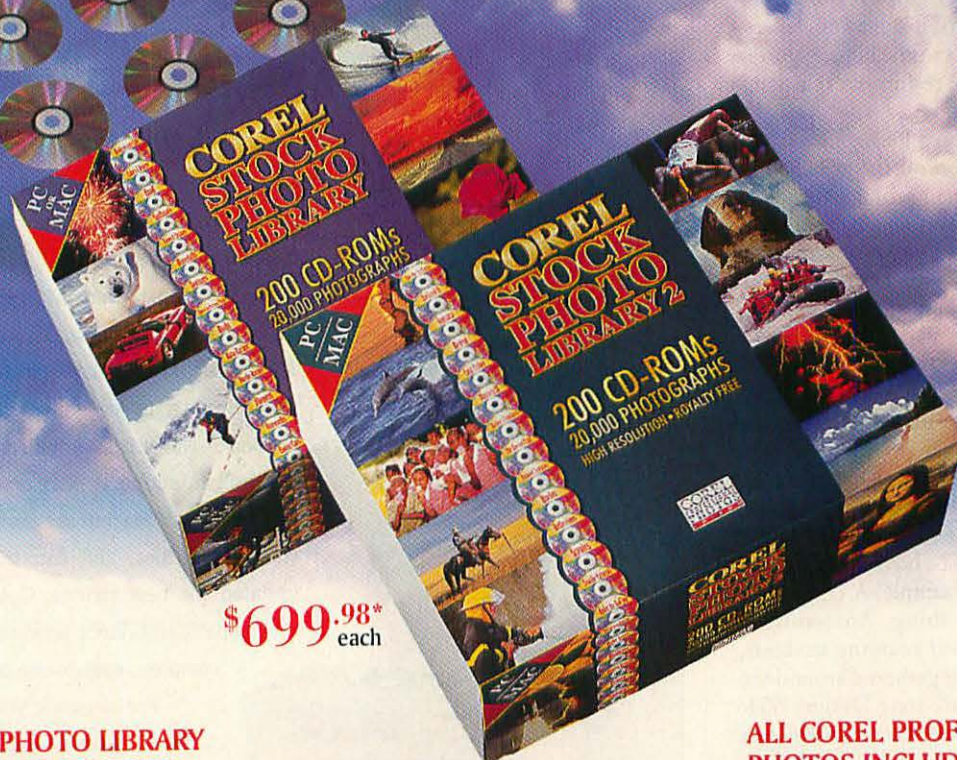
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# Readers Roar Back

*Retailers and shoppers report on the hazards of Mac purchases*

**A**S A CONSUMER COLUMNIST, my task is pretty simple: I try to give you information that will help make buying or using a Macintosh easier, less expensive, or more worthwhile. Sometimes I do this by researching purchases and examining the benefits and drawbacks of buying through independent stores, large chains, and mail order. Such a comparison recently hit a nerve among more than 60 readers and a couple of retailers. One quickly zapped me with several pointed electronic missives after reading about my experiences in shopping for new Macs ("The Buying Game," *Conspicuous Consumer*, April 1995).

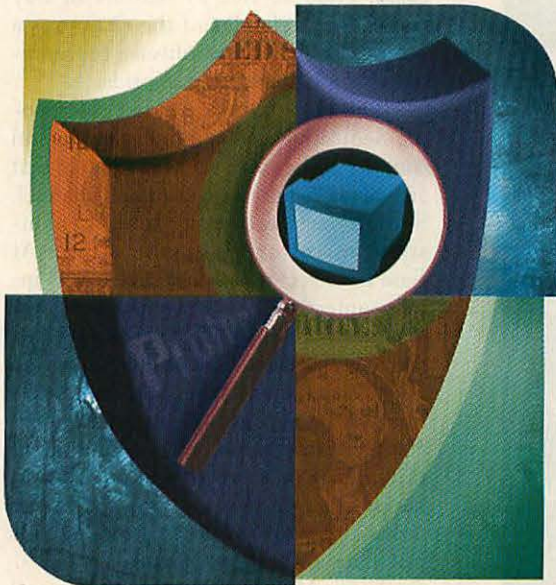
"I read your article about the great service you received at ComputerWare," wrote Wally Glenn, a salesperson at a mostly Mac computer store in Seattle. "I noticed that despite the better service you got there, and the fact that they were willing to match prices, you decided that it was better to drive way out of your way or order way across the continent than to continue doing business with a Mac store that you were happy with. You just summed up the reason why there are few Mac-only stores left."

In fact, I got acceptable but not great service at ComputerWare, a store I like very much—but never mind; Glenn was on a roll. "We get people like you all the time who come in, ask all their questions, then go down to the warehouse store to make the purchase. Why? Because it was cheaper. . . . When you go out to dinner to a nice restaurant, do you whip open the menu, point to the filet mignon, and tell the waiter point-blank, 'I can get this cheaper down the street at Denny's. Now, are you going to match their price?' . . . Yet you walk into the computer store and act like a jerk demanding that we slash the price or you're going to walk. . . . You will eagerly buy [a Mac] from some big, unfriendly chain from some teenager making \$6 an hour."

Glenn is willing to say on the record what other independent Mac retailers will merely whisper. According to these pro-

fessionals, penny-pinchers like me may put them out of business. They argue that customers who require more personal attention should be willing to pay for it. How much more? The difference can be small or sizable. For a Hewlett-Packard DeskWriter 540, for example, some chain stores charge customers only \$5 over their cost, while another store might charge an additional \$40 or more.

For their extra cost, customers at his store get a smart staff and good support, according to Glenn, who was helping an established customer when I called to ask permission to quote from his E-mail. This woman had bought from Glenn earlier but bought her new Mac by mail to save money. When problems arose, she went back to Glenn hoping he could help.



As Glenn put it in one E-mail, "I know the consumer is saving more money than ever before. This comes at the expense of no technical support, no knowledgeable sales staff, no service department with the latest drivers and bug-fixes. In a very real way, the consumer is really getting ripped off."

## Shoppers' Hell or Paradise?

Are consumers being ripped off? Some certainly seem to feel that way. The response to my April column was far

greater than any of my previous columns ever received. More than 40 comments were specific to CompUSA. Several were from people who were happy with the country's oldest computer superstore. A reader in Pennsylvania said he went back to the King of Prussia store to buy a Power Mac because he was treated so well when he bought his first Mac. But the vast majority of letter writers were deeply dissatisfied with their local stores.

CompUSA is the largest computer superstore, with 83 stores in 41 cities in 26 states. Because the chain is so large and does so much business, it's an easy target for criticism. And because the *Macworld* readers I heard from are a self-selected bunch, it's impossible to draw conclusions from their reports that are in any way statistically valid. Nevertheless, it was disheartening to hear that the atmosphere I found at CompUSA's Emeryville, California, store was not unique.

A network manager from Massachusetts, for example, reported that she used to recommend her local CompUSA in Woburn to coworkers because of its great displays and extensive merchandise. But on a recent trip to the store she found that "all of the Mac hardware (or what was left of it) had been shoved into one little corner of the floor, behind the printer and SCSI cables. They now carried only Performas and a few leftover 630s. The only printer on display was an HP DeskJet."

Other readers also complained about lackluster help from the sales staff, suspect advice, limited merchandise, and out-of-date software. As one dissatisfied soul from Louisiana wrote, "Their service, selection, heck, their whole store is Mac-unfriendly and I don't want to spend my hard-earned money in a store that doesn't appreciate me or my computer."

That sentiment was echoed by a Mac  
*continues*



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professional from Long Island, New York, who went shopping with a friend, hoping to strike up a good deal in buying two 500MB to 700MB hard drives together. "There was a Mac section, but it didn't even have any 28.8-Kbps modems," he wrote. "The software section was minuscule compared to the Wintel sections, but that was expected. What wasn't expected was the low level of helpfulness and knowledge on the part of the staff, including the so-called Mac people, who couldn't have been less helpful or knowledgeable. When we went to the counter where the internal hard drives were kept and asked if certain drives could be installed in our computers, we were told that, basically, they didn't know and didn't care to try and find out.

"We went home, sobered by the experience, feeling like MacLeperes in a DOS/Windows world. We ended up ordering drives from APS and Spin, both of whom were helpful, knowledgeable, and shipped overnight."

## Witnesses for the Defense

Is the entire CompUSA chain Mac-unfriendly? Not according to several *Macworld* readers, who, like the Pennsylvania reader, cited low prices and, in some cases, good service as reasons to buy there. One defender of the chain was a Macintosh hardware/software representative of a CompUSA in Florida.

The Florida store has five salespeople dedicated to Macintosh service and support and carries all Mac models that are supported through the retail channel. Staffers "are ready and glad to demonstrate to customers anything from At Ease to Director (much unlike our Wintel counterparts, who have the challenge of simply keeping up with new 'standards' and drivers)," according to the rep. "We also handle tech-support calls on the floor for people, even if they didn't purchase their systems here. Our way of thinking is, the greater the number of happy Macintosh users out there, the more the word of how great Apple's machines are will get around."

Larry Mondry, CompUSA's genial executive vice president for general merchandise, also leaped to the chain's defense. Mondry pointed out that several CompUSA stores do a brisk business in Mac sales and that the chain has no wish to alienate Macintosh users and doesn't care what type of computer customers buy, as long as they buy from CompUSA.

"CompUSA's intention is to have the right products at the right place at the right time with the right staff," said Mondry. "Achieving the goal is the challenge of all retailers." Mondry said the

## SERVICE HERO

**D**eborah Cowder of Oakland, California, writes to praise Berkeley, California-based CJS Systems. CJS came to her rescue when the floppy drive in Cowder's PowerBook 180c died one day before she was leaving on a trip. "I called CJS at 11 a.m. They said to bring it in. I did; they diagnosed it and then replaced the floppy drive while I waited! All told, it took about one hour."

company's share of Mac business has grown in the past year. And the company hopes to do even better by working with Apple toward improvement. He conceded that CompUSA should not carry outdated software. "We carry software based on a customer's desire to buy it," he said. "Sometimes we err. We're human."

CompUSA's current software shortcomings should improve, according to Mondry. "In the heavy Mac markets, we want to have the best software selection available for the retail buyer. . . . We believe we've got great opportunity in software, because no one company has done a very good job at retail of offering Macintosh software."

That's a big part of why, compared with PC users, so many more Mac users buy software by mail, Mondry says. Can CompUSA go from a skimpy Mac software selection to the best in the business? Let's give 'em six months and then see.

## The Buying Game Redux

Mail-order thrives because established companies provide good service at low cost. I expect that readers will continue to buy by mail, as well as patronize chain stores and buy from independents. Mac buyers, like human beings everywhere, use the fierce competition among computer dealers and mail-order companies to save themselves some money. That means salespeople like Wally Glenn will have to keep fighting to convince their customers that paying more for a Mac can be a good investment. **m**

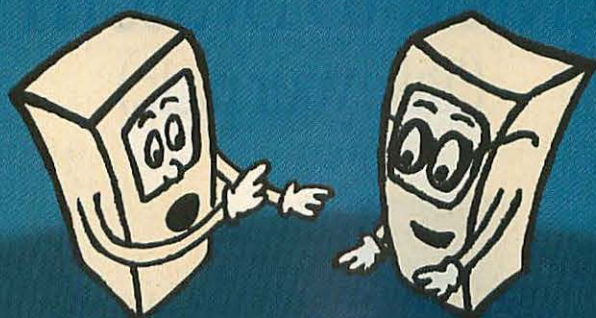
You can write to contributing editor DEBORAH BRANSCUM, *Macworld's* Conspicuous Consumer, at *Macworld*, 501 Second St., San Francisco, CA 94107, or via the Internet ([branscum@aol.com](mailto:branscum@aol.com)).

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107. Also, drop *Conspicuous Consumer* a line if a company is ignoring you.



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Allen White, Director of the Advanced Technology Group, Apple Computer, Inc.
- ▶ **Apple's Internet Story: Servers, Clients and Communications**  
Ike Nassi, Vice President, Apple Computer, Inc.

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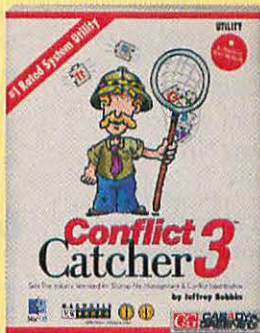


# Need another reason to upgrade to System 7.5?

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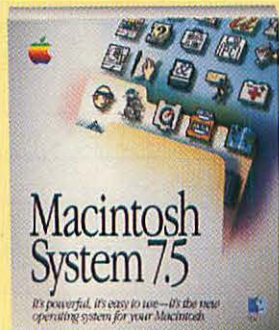


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# Editors' Choice

THE BEST PRODUCTS FEATURED IN MACWORLD

Edited by Patricia Carberry-Harris

*Macworld Editors' Choice* is a complete listing of the hardware and software products selected as the best of their type in *Macworld's* comparative articles. A ♦ next to a product indicates that we chose more than one product in that category. A Ⓢ next to a product listing indicates that a native Power Mac version is available.

## Hardware

### MONITORS

#### SMALL COLOR MONITORS, Jan 94

**14-inch display:** ♦ Sony CPD 1430; Sony Corp. of America, 800/222-7669; \$779.95.  
♦ Nanao FlexScan F340iW; Nanao USA, 800/800-5202; \$799.

**15-inch display:** NEC MultiSync 4FG; NEC Technologies, 708/860-9500; company's estimated price \$755.

#### TWO-PAGE COLOR MONITORS, Nov 94

PressView 21 Display System; SuperMac Technology, 408/541-6100; \$3999.

### NETWORK HARDWARE

#### REMOTE-ACCESS SERVERS, Oct 94

**Mixed networks:** NetConnect Remote Access Server; Asanté Technologies, 408/435-8401; \$3899 for eight ports.

**AppleTalk networks:** ARA Multiport Server; Apple Computer, 408/996-1010; four ports \$1799, eight ports \$3298.

### PRESENTATION HARDWARE

#### PORTABLE PRESENTERS, Jan 95

Z115; nView, 804/873-1354; \$5495.

### PRINTERS

#### COLOR PRINTERS, Aug 94

**Low-end ink-jet:** DeskWriter 560C; Hewlett-Packard, 800/752-0900; \$719.

**Solid ink-jet:** Phaser 300i; Tektronix, 503/682-7377; \$9995.

**Thermal-wax transfer and color laser:** Phaser 220i; Tektronix, 503/682-7377; \$5995.

#### DYE-SUBLIMATION PRINTERS, Jul 94

**Prepress proofing—tabloid size/fastest:** Phaser 480; Tektronix, 503/682-7377; \$14,995.

#### Prepress proofing—tabloid size/most complete:

Rainbow; 3M, 612/733-1110; company's estimated price \$20,000.

**Prepress proofing—letter size:** ProofPositive Full Page; SuperMac Technology, 408/541-6100; \$7999.

**General publishing and business:** Phaser IISDX; Tektronix, 503/682-7377; \$9995.

#### PERSONAL PRINTERS, Sep 94

**Ink-Jet:** DeskWriter 520; Hewlett-Packard, 800/752-0900; \$365.

**Laser—\$1000 to \$1600:** microLaser Pro 600; Texas Instruments, 214/995-6611; \$1599.

#### WORKGROUP PRINTERS, Jun 95

**Tabloid-size printers:** LaserJet 4MV; Hewlett-Packard, 208/323-2551; \$3549.

**Legal-size printers:** ♦ Optra Lx; Lexmark, 606/232-2000; \$3298.

♦ LaserWriter 16/600 PS; Apple Computer, 408/996-1010; company's estimated price \$2299.

### SCANNERS/IMAGE CAPTURE

#### ELECTRONIC CAMERAS, Sep 94

Apple QuickTake 100; Apple Computer, 408/996-1010; \$749. Ⓢ

#### HIGH-BIT FLATBED COLOR SCANNERS, Mar 95

♦ Arcus II; Agfa, 508/658-5600; \$3495.

♦ PowerLook; Umax, 510/651-8883; \$3495.

#### LOW-COST COLOR SCANNERS, Nov 93

**\$1300 to \$1600:** ♦ La Cie Silverscanner II; La Cie, 503/520-9000; \$1599. ♦ Hewlett-Packard ScanJet IIc; Hewlett-Packard, 800/752-0900; \$1599.

**Under \$1300:** Mirror 800 Plus Color Scanner; Mirror Technologies, 612/633-4550; \$1299.

#### OCR, Nov 93

OmniPage Professional; Caere Corp., 408/395-7000; \$995. Ⓢ

### SYSTEMS/STORAGE

#### 1.3GB OPTICAL STORAGE, Dec 94

**Best low-cost solution:** 1.3Gig MO; Club Mac, 714/768-8130; \$2099.

**Best overall performance:** Genesis 1300; Microtech, 203/468-6223; \$2899.

#### HIGH PERFORMANCE DRIVE SYSTEMS, Jul 95

**Accelerator card:** SiliconExpress IV; Atto Technology, 716/691-1999; \$995.

**Drive mechanism:** IBM UltraStar series; IBM (available from several resellers), prices vary by reseller.

#### QUAD-SPEED CD-ROM DRIVES, Jun 95

APS T3501; APS Technologies, 816/483-6100; \$299.95.

#### HIGH-SPEED HARD DRIVES, Aug 93

**2.7GB drives:** ♦ Nova XL 2700; Microtech, 203/468-6223; \$2999. ♦ Vista 3.5GB; Relax, 510/471-6112; \$3499.

**SCSI-2 adapter:** QuickSCSI; PLI, 800/288-8754; \$499.

#### PC COPROCESSING, Oct 94

OrangePC Model 210; Orange Micro, 714/779-2772; \$1283.

#### RAID STORAGE SYSTEMS, Apr 95

**RAID 3 or 5:** MR/5 RAID; MegaDrive Systems, 310/247-0006; \$18,840.

**RAID 0:** ♦ Joule RAID; La Cie, 503/520-9000; \$2999.

♦ Diskovery 8200W; Optima Technology, 714/476-0515; \$7790. ♦ SledgeHammer 2000FMF; FWB, 415/474-8055; \$2359.

#### SYSTEM UPGRADES, Feb 95

**Upgrade for Macintosh Quadra 650, 800, or 950:** Power Macintosh Upgrade Card; Apple Computer, 408/996-1010; \$699.

**Upgrade for other 680X0 Macs:** Replace with Power Macintosh 6100/60 with CPU booster and cache card. Power Macintosh 6100/60; Apple Computer, 408/996-1010; \$1819 (base system with 8MB of RAM). PowerClip (CPU booster); Newer Technology, 316/685-4904; \$245. 256K cache card; various companies, roughly \$200.

### VIDEO/DISPLAY

#### 24-BIT VIDEO CARDS, Apr 94

**Inexpensive acceleration:** PrecisionColorPro 24XP; Radius, 408/434-1010; \$599.

**Full-featured acceleration:** Thunder II GX-1360; SuperMac Technology, 408/541-6100; \$4499.

#### HIGH-END VIDEO EDITING, Jun 94

**Presentation video:** ♦ MoviePak2 Pro Suite; RasterOps, 801/785-5750; \$4199. ♦ VideoVision Studio; Radius, 408/434-1010; \$4499.

**Corporate video (offline):** Media Composer 400s; Avid Technology, 508/640-6789; \$14,995.

**Corporate video (online):** VideoCube; ImMix, 916/272-9800; \$40,500.

#### PHOTOSHOP ACCELERATORS, Apr 94

PhotoBooster; Radius, 408/434-1010; \$999.  
*continues*



# Editors' Choice

## Software

### ACCOUNTING/FINANCE

#### GROWING A SMALL BUSINESS, Nov 93

**Small-business system:** M.Y.O.B.; Best Ware, 201/586-2200; \$199.

**Home office/personal finance:** MacMoney; Survivor Software, 310/410-9527; \$119.95.

### BUSINESS TOOLS

#### PORTABLE-DOCUMENT SOFTWARE, Apr 95

**Document Distribution:** Common Ground 1.1; No Hands Software, 415/802-5800; \$189.95.

#### STATISTICS, Oct 93

**Exploratory data analysis:** DataDesk 4.1; Data Description, 607/257-1000; \$595.

**Comprehensive package:** SYSTAT 5.2.1; SYSTAT, 708/864-5670; \$895.

### CD-ROM

#### TOP 10 CD-ROMS, Mar 94

**Overall:** Seven Days in August; Time Warner Interactive Group, 818/955-9999; \$79.99.

### COMMUNICATIONS/NETWORKS

#### COMMUNICATIONS SOFTWARE, Aug 94

**Basic connectivity:** ZTerm; David P. Alverson (no phone number available); \$30.

**Terminal emulation:** Crosstalk for Macintosh; Digital Communications Associates, 404/442-4000; \$195.

**Internet exploration:** VersaTerm; Synergy Software, 215/779-0522; \$125.

#### DOS WINDOWS EMULATION, Oct 94

Timbuktu Pro 1.0.3 for Macintosh, Timbuktu 1.1 for Windows; Farallon Computing, 510/814-5000; \$199 each.

#### NETWORK CONNECTIVITY, Sep 93

NetWare for Macintosh; Novell, 801/429-7000; \$495 for 5-user license to \$2295 for 200-user license.

#### PROTOCOL ANALYZERS, Jul 94

EtherPeek, AG Group, 510/937-7900; \$795.

#### TERMINAL EMULATOR, Oct 93

VersaTerm; Synergy Software, 215/779-0522; \$149.

### GRAPHICS

#### 3-D MODELING, Dec 94

**Stand-alone modeler:** formZ; autodessys, 614/488-9777; \$1495.

**Integrated-modeling package:** Strata StudioPro; Strata, 801/628-5218; \$1495.

**Entry-level modeler:** Infini-D; Specular International, 413/253-3100; \$695.

#### CLIP ART'S GREATEST HITS, Jan 94

**Overall collection:** ClickArt Studio Series; T/Maker Company, 415/962-0195; \$99.95 per volume.

Electronic Clipper subscription service; Dynamic Graphics, 800/255-8800; \$67.50 per month.

Images with Impact series; 3G Graphics, 800/456-0234; \$99.95 to \$129.95 per volume, CD-ROM \$499.

Metro ImageBase Electronic Clip Art; Metro ImageBase, 800/525-1552; \$74.95 per volume, CD-ROM \$149.95.

Typographers' Ornaments; Underground Grammarian, 609/589-6477; \$25 per volume; ten TIFF albums \$200; EPS volumes \$50 each.

#### DRAW PROGRAMS (LOW-COST), Sep 93

**Budget draw:** Expert Draw; Expert Software, 305/567-9990; \$49.95.

**Budget draw/paint:** UltraPaint; Deneba Software, 305/596-5644; \$79.

**Beginners' program:** Aldus SuperPaint; Aldus Consumer Division, 619/558-6000; \$149.95.

**Overall:** Canvas; Deneba Software, 305/596-5644; \$399.

#### FONT BUYERS' GUIDE, Mar 94

**Text-face collection:** Type On Call CD-ROM; Adobe Systems, 415/961-4400; \$99 (this price includes the ability to unlock two families from preselected packages); an additional \$25 enables you to unlock individual faces, or \$69 to \$179 for unlocking families.

**Display/decorative-face collection:** Fontek; Letra-set, 201/845-6100; \$39.95 per face.

**Bargain collection:** Monotype ValuePack; Monotype, 312/855-1440; \$89 for 57 fonts.

#### IMAGE DATABASES, Oct 93

Aldus Fetch 1.0; Adobe Systems, 206/628-5739; \$295.

Multi-Ad Search 2.0; Multi-Ad Services, 309/692-1530; \$249.

#### IMAGE EDITORS, Feb 95

Adobe Photoshop 3.0; Adobe Systems, 415/961-4400; \$895.

### INTEGRATED SOFTWARE

#### INTEGRATED SOFTWARE, Feb 94

ClarisWorks; Claris Corporation, 408/727-8227; \$299.

### ONLINE SERVICES

#### ONLINE SERVICES, Aug 94

**E-mail:** America Online; America Online, 703/893-6288; basic monthly fee \$9.95.

**Reference:** CompuServe; CompuServe Information Service, 614/457-0802; basic monthly fee \$8.95.

### ORGANIZATION/PRODUCTIVITY

#### GRAPHING SOFTWARE, Aug 94

DeltaGraph Pro 3 3.0.4; DeltaPoint, 408/648-4000; \$195.

#### SALES-AUTOMATION SOFTWARE, Oct 93

Contact Ease; WestWare, 619/274-5053; one user \$395, five users \$1495.

CBS; Colleague Business Software, 512/345-9964; \$495.

#### TEXT-RETRIEVAL SOFTWARE, Dec 93

**Small system:** On Location; On Technology, 617/374-1400; \$129.

**Multiuser system:** Personal Librarian; Personal Library Software, 301/990-1155; \$995.

### PRESENTATION TOOLS

#### PRESENTATION SOFTWARE, Jul 94

Persuasion 3.0; Adobe Systems, 206/622-5500; \$495.

### UTILITIES

#### BRAVE NEW DOCUMENTS, Jan 94

**Application-independent document distribution:** Common Ground; No Hands Software, 800/598-3821; \$189.95.

**Book-length documents:** FrameReader; Frame Technology, 800/843-7263; \$84.95.

#### PRINTING, Sep 93

**PC-printer cable packages:** PowerPrint; GDT Softworks, 604/291-9121; \$149.

#### VIRUS KILLERS, Jul 94

**Commercial software:** Virex; Datawatch, 919/549-0711; \$99.95.

**Free software:** Disinfectant; free from various online services.

### VIRTUAL MEMORY SOFTWARE

#### VIRTUAL MEMORY, Jun 94

**Virtual memory software:** Virtual 3.0; Connectix Corp., 415/571-5100; \$99.

**Memory-boosting software:** RAM Doubler 1.0.1; Connectix Corp., 415/571-5100; \$99.

### WORD PROCESSORS

**HIGH-END WORD PROCESSOR (for fast 68040 Macs and Power Macs), Mar 95**

Microsoft Word 6.0; Microsoft Corporation, 206/882-8080; \$325.

#### LOW-COST WORD PROCESSOR, Mar 95

MacWrite Pro; Claris Corporation, 408/727-8227; \$99.


Vendors: Please write to *Macworld Editors' Choice*, 501 Second St., San Francisco, CA 94107, or send a fax to 415/442-0766 to inform us of changes in your phone number or your product's list price.



# Star Ratings

HARDWARE AND SOFTWARE REVIEWS AT A GLANCE

Edited by Wendy Sharp

*Macworld Star Ratings* lets you compare Macintosh products by providing summaries of *Macworld's* authoritative product reviews from the past year. The number of stars indicates quality; our reviewers assign five stars to outstanding products and one star to poor ones. The  symbol indicates that a product is available in a native Power Mac version.

If a product has been upgraded since our last review, the most recent version number supplied by the vendor appears in parentheses after the reviewed version number. To read a full review of any product in the listing, please consult the issue listed at the end of each synopsis.

Vendors: Please write to *Macworld Star Ratings*, 501 Second St., San Francisco, CA 9410 to inform us of changes in the version number or list price of your product, or of changes to your phone number.

## Software

### BUSINESS TOOLS

★★★ **AccuZip6 1.8.7, Software Publishers, 800/233-0555, \$689.** Bulk-mail software has informative progress indicators, batch and individual processing, low rates, and flexible parsing during import, but the interface is incomprehensible. Sep 94

★★ **Adobe Acrobat 2.0, Adobe Systems, 415/961-4400, \$195.** The font fidelity of this portable-document software is uneven, and the software demands too much in resources compared with other portable-document programs. Mar 95


★★★ **Adobe Acrobat for Workgroups 2.0, Adobe Systems, 415/961-4400, \$1595.** As a collaboration tool, this software is relatively inexpensive and offers well-done annotation tools. However, it's resource-intensive, and creating hypertext documents with it isn't easy. Mar 95


★★★ **BizPlan Builder 5.0, Jian, 415/254-5600, \$129.** To create a comprehensive business plan, just fill in the blanks in this easy-to-use spreadsheet/word processor template. Jun 95

★★ **Bulk Mailer CASS 1.00d (1.3), Satori Software, 206/443-0765, \$150.** Unattended operation is possible with this bulk-mail software, but batch processing is slow and the program has coding problems. Sep 94


★★★ **Business Plan Writer 6.0, Graphite Software, 301/984-1100, \$99.** This proposal-writing template can help entrepreneurs create a detailed business plan, but—unlike the competition—it won't help them format an attractive presentation. Jun 95

★★★ **CA-Cricket Graph III 1.52 (1.53), Computer Associates International, 516/342-5224,**


**\$129.** Graphing software's features are just right for charts in the physical and social sciences, but lack pizzazz. The program is easy to learn and use, and includes math features for data transformations and curve fitting. Dec 94 


★★★★ **ClarisWorks 3.0, Claris Corp., 408/727-8227, \$129.** Inexpensive, easy to use, and powerful integrated software is the best package available. It's far better in terms of features, speed, integration, and use of system resources than its competition. Frugal use of RAM makes it a good choice for owners of older Macs. Feb 95 

★★★★ **Crystal Ball 3.0 (3.0.1), Decisioneering, 303/449-5177, \$295.** Compact business-simulation software is fast enough for complex projects and can pay for itself in disaster-avoidance in a variety of business tasks. Oct 94

★★★★ **Decision Analysis 2.5, TreeAge, 617/536-2128, \$379.** Decision-assistance software handles complex business cases by constructing tree diagrams of probabilities and payoffs. It offers a type of modeling that is more realistic and easier to modify than other options. Nov 94 

★★★ **Extend+BPR 3.0 (3.1), Imagine That, 408/365-0305, \$990.** Business-modeling software includes superior templates for business-process reengineering, but some programming experience is helpful. Oct 94

★★★ **FastTrack Schedule 2.1 (3.0), AEC Software, 703/450-1980, \$299.** Simple project-management software is ideal for managers who need to put together a schedule quickly and easily, but if you require more power to manage conflicts between multiple projects and resource allocation, you'll need a more comprehensive program. Sep 94 


★★★★ **Helix Express 2.0.1 (3.0), Helix Technologies, 708/465-0242, \$589.** Icon-based relational-database software's improved performance makes it a serious competitor for all-Mac networks. Especially notable is its much faster speed; multiuser operation is downright snappy. Jul 94 


★★★ **InfoDepot 2.0 (2.3), Chena Software, 610/770-1210, \$295.** All-in-one program for project planning includes tools for brainstorming and organizing ideas; scheduling project steps; and entering, calculating, and presenting data. It does a good job but has some flaws. Jan 95


★★★★ **MarcoPolo 3.0, Mainstay, 805/484-9400, \$895.** Full-featured document-management system is significantly improved. The addition of OCR—both the handling of unrecognized words and the ability to batch-process TIFF files with OCR—make it very usable. Jan 95

★★★ **MicMac 2.0v1, Nirvana Research, 408/369-1200, \$89.** The concept of Mac as dictation machine is undeniably attractive, and Nirvana Research has pulled it off well. It takes lots of hard drive space to save recordings, though. Nov 94

★★★★ **Microsoft Excel 5.0, Microsoft Corp.,**

**206/882-8080, \$339.** Although the feature set of this Power Mac spreadsheet is stunningly rich, the system requirements for a full install are jaw-dropping, including 27MB of hard drive space plus 24MB of RAM without virtual memory. Still, it is relentlessly complete. Jan 95 

★★★ **Microsoft Works 4.0, Microsoft Corp., 206/882-8080, \$99.95.** Although this isn't the best integrated package around, it's a sensible, low-cost choice. It provides users with a respectable word processor, database, spreadsheet, calendar, and address book, as well as a slide-show module, and drawing and communications tools. Jan 95 


★★★★ **OmniPage Professional 5.0, Caere Corp., 408/395-7000, \$695.** In a historic first for OCR, this Power Mac software has an accuracy of 100 percent on good text samples. It does still make occasional baffling minor errors on real-world documents. Nov 94 

★★★★ **Pablo 2.0.1 (2.0.4), Andyne Computing, 613/548-4355, \$695.** Effective end-user data-reporting tool creates a considerable workload, but sidesteps the hassles of SQL data access and produces great reports with minimal effort. Jul 94

★★★ **Street Atlas USA 2.0, DeLorme Mapping, 207/865-1234, \$79.** For the most part, this geographical information software delivers what it promises at a great price. Oct 94

★★★ **TeamFlow 3.1, CFM, 617/275-5258, \$295.** Total Quality Management flowchart software is a valuable business tool. Its report printing and customizability are limited, however. Nov 94

★★★★ **TopDown 4.0 (4.1), Kaetron Software Corp., 713/298-1500, \$345.** Flowcharting program's support for custom symbols and automatic drawing aids, along with its ability to let you easily create and navigate lower-level charts, make it a productive tool. Jul 94

★★★★ **ZipZapp 1.0 (2.0), True Basic, 603/298-8517, \$34.** You can use this data-reference utility to find an area code, the correct spelling of a city's name, and more. The interface is intuitive, and the cost, low. Oct 94 

★★★ **ZP4 12.1 (14.4), Semaphore Corp., 408/688-9200, \$125.** Inexpensive bulk-mail software supports batch and individual processing, but the progress indicators are uninformative, and unattended operation requires extra work. Sep 94

### COMMUNICATIONS/NETWORKS

★ **BLAST Professional, BLAST Inc., 919/542-3007, \$139.** Our reviewer could not get this telecom software to work reliably and consistently during his tests, and found the minimalist and quirky interface frustrating. Jan 95

*continues*



# Star Ratings

★★ **HoloGate 1.0, Information Access Technologies, 510/704-0160, \$500.** Two unique features—UUCP and Usenet news distribution—are the primary reasons to consider this product. Otherwise, it comes up price-rich and feature-poor. Apr 95

★★ **The Internet Companion, The Voyager Company, 914/591-5500, \$29.95.** This well-written, HyperCard-based electronic book offers less information than others. Internet access is available through accompanying software, but it's a terminal-emulation screen. Dec 94

★★★★ **Internet Explorer Kit and Internet Starter Kit, Hayden Books, 317/581-3500, \$29.95 each.** Well-written books and useful software combine to produce one of the best introductions to the Internet available for Mac users. Dec 94

★★★★ **Internet Membership Kit 1.0 (2.0), Ventana Media, 919/942-0220, \$69.95.** If you need access to the Internet, this book and software combination is a good package. The best part about it is its included preconfigured software. Dec 94

★★★★ **MicroPhone Pro 2.0 (2.1), Software Ventures Corp., 510/644-3232, \$195.** The new feature set of this communications package includes multiple sessions, faxing, TCP/IP networking, and more, but it is a mixed bag. Not all the features are well integrated, although some are innovations for which users will be grateful. Oct 94

★★★★ **Netscape Navigator, Netscape Communications Corporation, 415/528-2555, \$39.** World Wide Web browser is well ahead of the competition in terms of features, stability, and ease of use. Although its E-mail features could use some improvement, it's the best way to surf the Net. May 95

★★★★ **NetWorks 3.0.4, Caravelle Networks Corp., 613/225-1172, \$1395 to \$2495.** For networks that sprawl across buildings or states, this network-monitoring utility is an indispensable tool. It continually polls devices, checking CPUs, routers, printers and hubs for signs of life. Apr 95

★ **PowerShare Collaboration Servers, Apple Computer, 408/996-1010, \$999.** Before this collaboration software will be ready for prime time, Apple needs to overhaul the complex Admin application, add serious diagnostic aids, provide comprehensive documentation, and offer knowledgeable technical support at a price less than that of the program itself. Aug 94

★★★★ **QuickMail 3.0, CE Software, 515/221-1801, \$199 to \$3799.** If you're shopping for a first-time E-mail application, this product is a good choice for ease of use and setup. The most promising new tool, rules-based messaging, lacks some important features. Jan 95

★★★★ **RunShare, Run, Inc., 201/529-4600, \$199 to \$2499.** System extension endeavors to pump up file-transfer speeds across both local- and wide-area networks. It offers twofold to threefold throughput gains for fast Macs and large files but is less useful with small files or slow Macs. Feb 95

★★ **SoftWindows 1.0, Insignia Solutions, 415/694-7600, \$499.** You can run Windows software on a PowerMac with this emulation software, but although it's a viable solution, you pay the price in terms of performance, compatibility, and actual cost. Aug 94

★★★★ **White Knight 12.0, The FreeSoft Company, 412/846-2700, \$139.** While this telecom software can be bewildering, it works impressively well. If you are willing to read the manual from cover to cover, the program may become your favorite telecom tool. Nov 94

## DESKTOP PUBLISHING

★★ **CheckPost 1.3, Working Software, 408/423-5696, \$89.95.** Interface aside, this imagesetter-simulation software is generally disappointing. It can't automatically scale pages, it prints on a single sheet, and its error reporting is limited. Nov 94

★★★★ **ClickBook 1.1 (1.2), BookMaker Corp., 415/354-8161, \$69.95.** If you need to create inexpensive booklets quickly and without hassle, this print utility that helps you format documents in double-sided booklet form is an excellent tool. Nov 94

★★★★ **Download Mechanic 1.0.2 (1.5), Acquired Knowledge, 619/587-4668, \$249.** The strengths of this PostScript downloader lie in its tools for dealing with problem files, but when dealing with large files, it performs slowly and occasionally crashes. Feb 95

★★★★ **FontChameleon 1.0.1 (1.5), Ares Software Corp., 415/578-9090, \$295.** Font utility introduces a new font-creation technology; it builds serif and sans serif fonts from a master outline file. It offers high-quality renditions of popular fonts, plus the ability to customize fonts. Sep 94

★★★★ **FontMixer 1.0, Monotype Typography, 312/855-1440, \$79.** Although a tad expensive for a one-trick pony, this font utility is a straightforward, relatively painless way to mix characters from different fonts to create composite fonts. Oct 94

★★★★ **Fontographer 4.0.4 (4.1), MacroMedia, 415/252-2000, \$495.** No other font editor does more or works better than this one. For the price of a few font families, it can give you a universe of unique faces. Oct 94

★★★★ **LaserCheck 1.0, Systems of Merritt, 334/660-1240, \$199.** Imagesetter-simulation software can save you hundreds of dollars, and many hours, on image-setting jobs by letting you use a laser printer to proof your work. Nov 94

★★★★ **Let'er RIP 2.0 (2.0.1), Lupin Software, 916/756-7267, \$239.** The flexibility, clean implementation, and attention to detail of this PostScript downloader make it a pleasure to use. Feb 95

★★★★ **PageTools 1.0, Extensis Corp., 503/274-2020, \$129.** Collection of ten PageMaker Additions is packed with utility. Many users will find the PageAlign, PagePrinter, and PageRulers Additions alone worth the price, and the others frosting on the cake. Dec 94

★★★★ **ReadySetGo 6.0.2, Manhattan Graphics Corp., 914/725-2048, \$395.** There's no strong reason not to use this desktop publishing software if its tools meet your needs, but there's no compelling reason to choose it, either. Its low price is nice, but not enough. Oct 94

★★★★ **theTypeBook 4.0, Rascal Software, 805/255-6823, \$59.95.** The manual needs work, but this type-specimen generator provides enough customization options to make it a worthwhile purchase. Jun 95

## EDUCATION/ENTERTAINMENT

★★★★ **3D Atlas 1.1, EA World, 415/571-7171, \$79.95.** Well-designed atlas enriches map data with narration, photos, statistics, and educational QuickTime movies. May 95

★★★★ **A.D.A.M. The Inside Story, A.D.A.M. Software, 404/980-0888, \$79.95.** Multimedia anatomy CD-ROM teaches basic anatomy and physiology with a tantalizing mix of sound, graphics, and animation. If you are the least bit interested in learning more about how the human body works, buy this program. Mar 95

★★★★ **Aquazone 1.0, Inago, 416/487-4005, \$59.** The fish in this aquarium simulation are beautiful, but—like many of their real-world counterparts—they're darned hard to keep alive. Only two varieties of fish are included. Jan 95

★★★★ **Creative Writer 1.0, Microsoft Corp., 206/882-8080, \$49.95.** Graphics/page-layout/word-processor hybrid offers some terrific type effects, zany sounds, and bright graphics. While it doesn't teach kids to be better writers, it does encourage them to develop ideas and provides a fun vehicle to express those ideas creatively. Sep 94

★★★★ **Crossword Wizard 1.0, Cogix Corp., 415/454-7217, \$49.95.** If you're a crossword fan, this crossword-puzzle generator is a must. Although it's not perfect, the play mechanics are fantastic. Dec 94

★★★★ **The Cruncher, Davidson & Associates, 310/793-0600, \$59.95.** If you want to teach a child spreadsheet basics, this combination educational spreadsheet and business application will do the job. It's creative and easy to use, but slow. Aug 94

★★★★ **CyberBoogie, Times Mirror Multimedia, 314/531-2503, \$49.95.** The easy interface, bouncy songs, and cute graphics of this children's animation software make it a good choice for very young kids, but its relative lack of features restricts it to the same group. Apr 95

★★★★ **Digital Chisel 1.2, Pierian Spring Software, 503/222-2044, \$199.95, site license \$995.** If I had a Chisel, I'd Chisel out some quizzes; I'd say how easy this is—I wouldn't. Ahem. What I mean is: this authoring tool lets educators create interactive quizzes, but suffers from a nonstandard interface. Jun 95

★★★★ **Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, \$395.** CD-ROM encyclopedia has excellent search capabilities, weighs much less than a shelf of books, and is lots of fun. Its timeliness and some hierarchical snafus were slight problems. Jul 94

★★★★ **Kids World, Bit Jugglers, 415/968-3908, \$30.** Although the painting tools could be more robust, this screen-saver-creation tool for kids is easy to use, cleverly designed, and can keep kids busy for hours. Mar 95

★★★★ **Material World, StarPress Multimedia, 415/274-8383, \$59.95.** This multimedia CD-ROM provides a fascinating look at diverse cultures from around the world by documenting the lives of average families. Jun 95

★★★★ **Small Blue Planet 2.0 (2.0.1), Now What? Software, 415/885-1689, \$59.95.** The satellite photos of this atlas are truly dazzling, although the interface is less than world class. May 95

★★★★ **Storybook Weaver Deluxe 1.0, MECC, 612/569-1500, \$69.95.** Hooray for applications that encourage kids to be creative! This one lets them combine pictures, sounds, and words to make their own storybooks. May 95

★★★★ **Theorist 2.0, Waterloo Maple Software, 519/747-2373, \$299.** Despite an occasionally odd interface (for example, a hammer icon), this symbolic-math program is a great learning aid for students. Jun 95

★★★★ **WarPlanes 1.0, Maris Software, 800/336-0185, \$69.** Wonderful multimedia CD-ROM tours the post-WWII era in military aviation. As well as pictures and text, it includes rotatable models of aircraft, an extensive database, campaign maps, historical narration, live combat audio, and three flight simulators. Mar 95

★★★★ **Widget Workshop, Maxis Software, 510/254-9700, \$44.95.** Fiendishly clever mad scientist's laboratory allows you to build Rube Goldberg-style widgets



out of metronomes, switches, light bulbs, and much more. It encourages imagination and exploration, plus kids think it's cool. Apr 95

## FINANCE/ACCOUNTING

★★ **Financial Competence 1.5, Competence Software, 603/435-5098, \$99.** Business economics tutorial explains how financial statements are compiled and how they relate to each other. Jul 94

★★★★ **MacMoney 4.01 (4.02), Survivor Software, 310/410-9527, \$89.95.** Personal-finance software has new and improved features that will please longtime users, but it hasn't kept up with the leaders in the field and won't win many new converts. Jul 94

★★★★ **M.Y.O.B. 5.0, BestWare, 201/586-2200, \$139; \$239 w/payroll.** A well-designed interface makes double-entry accounting easy enough for anyone to do. And—for those small-business owners who are keeping an eye on the bottom line—the price is right. May 95

★★★★ **QuickBooks 3.0, Intuit, 415/322-0573, \$119.** Full-featured double-entry accounting program is easy to use, but its operation is not entirely Mac-like and its cryptic error messages may cause you to ignore serious problems. Jun 95

★★★★ **Quicken 5.0, Intuit, 415/322-0573, \$49.95.** The addition of a calendar and new ease-of-use features keep this personal finance software comfortably ahead of the pack. This upgrade is an incremental, but still welcome, improvement over an already excellent product. Feb 95

★★★★ **StreetSmart 1.0, Charles Schwab & Company, 800/334-4455, \$59.** If Schwab is where you want your investments held, and if you want to have tighter control over your portfolio and save on brokerage fees, you should seriously consider this financial investment software. Feb 95

## GRAPHICS

★★★★ **Adobe Dimensions 2.0, Adobe Systems, 415/961-4400, \$199.** 3-D effects software has added color support, as well as drawing and text tools. Its ability to create resolution-independent 3-D images and map two-dimensional art earn Dimensions a place on a designer's hard drive. Apr 95

★★★★ **Adobe Illustrator 5.5, Adobe Systems, 415/961-4400, \$595.** Despite slight speed disappointments, this draw program's upgrade is a bargain. It offers improved text-formatting functions and new trapping capabilities and includes more than 200 tile patterns, 220 fonts, and the Acrobat Distiller and Acrobat Exchange utilities. Sep 94

★★★★ **Adobe Photoshop 3.0, Adobe Systems, 415/961-4400, \$895.** Image-editing program both broadens its capabilities and simplifies its work environment in this dynamic upgrade. While not perfect, the pros far outweigh the cons. Jan 95

★★ **Art Explorer 1.0, Aldus Consumer Division, 206/628-2749, \$49.95.** While its cartoon style is refreshing and its features promising, this paint/draw program for kids 8 to 12 years old is still rough around the edges. Its biggest limitation is that it's unusably slow on 68030 Macs. Feb 95

★★★★ **Blueprint 5.0, Graphsoft, 410/290-5114, \$295.** For plain old 2-D drafting, this CAD software has a rich, easy-to-use feature set and is admirably fast. The Power Mac version in particular is a first choice for large architectural or engineering diagrams. Jan 95

★★★★ **ClarisDraw 1.0 (1.0v2), Claris Corp., 408/727-8227, \$399.** For presentations without grand artistic pretensions, this draw program can be an effective tool. Considering the wobbliness of some of its features, however, \$400 may be too much to pay. Jan 95

★★★★ **Dabbler 1.0, Fractal Design Corp., 408/688-5300, \$99.** Art-education and paint software provides an excellent paint set with an appealing if slightly quirky interface, at a great price. Nov 94

★★★★ **DeBabelizer Lite 1.0 (1.1), Equilibrium Technologies, 415/332-4343, \$129.** Terrific graphics utility converts graphics files from one format to another. It offers a choice selection of capabilities at a nice, slim price. Aug 94

★★★★ **ElectricImage Animation System 2.0 (2.1), Electric Image, 818/577-1627, \$7495.** Although the price may seem incredibly high, this software, with its extraordinary animation and image-rendering capabilities, is worth every penny for cinematic-production professionals. Dec 94

★★★★ **Flying Colors Davidson & Associates, 310/793-0600, \$59.95.** While not the most dynamic kids' program, this paint/draw program provides easy-to-use tools and nicely drawn stamps for ages eight to adult. Feb 95

★★★★ **Gryphon Batch It 1.0, Gryphon Software, 619/536-8815, \$199.** Arranges tiles in a visual interface to automate repetitive graphics operations. Although it lacks conditional statements, this batch processor is a time-saver. Jun 95

★★★★ **IntelliDraw 2.0 (2.0.1), Adobe Systems, 415/961-4400, \$99.99.** Wonderful general-purpose graphics package works well, does a great job of automating drawing tasks, and is straightforward. Despite its breadth of features, it always feels approachable. Sep 94

★★★★ **Koyn Fractal Studio 2.02 (2.1), Koyn Software, 314/878-9125, \$119.95.** Software lets you generate beautiful fractals of your own design. It's a reasonable choice if you are interested in Sierpinski triangles or naturalistic forms, but it's not an all-fractals-for-all-people program. Aug 94

★★★★ **KPT Bryce 1.0 (1.1), HSC Software, 805/566-6200, \$199.** For less than \$200, you get a remarkable 3-D landscape-rendering program, a CD-ROM full of images, a slide-show utility, and even some screen-saver modules. Although the innovative, graphics-heavy interface can be confusing, this software is lots of fun. Dec 94

★★★★ **Live Picture 1.5.5, HSC Software, 805/566-6200, \$995.** At its core, this image editor is a promising program rather rudely assembled atop some marvelous technology. Though fast and blessed with all the benefits of a proxy-based system, its day-to-day functions leave plenty of room for improvement. Dec 94

★★★★ **LogoMotion 1.0 (1.5), Specular International, 413/253-3100, \$149.** Easy-to-use 3-D package is eminently affordable. It's a terrific program, both for creating flying logos and as an entry-level 3-D package for nonprofessionals. Nov 94

★★★★ **MacDraft 4.0, Innovative Data Design, 510/680-6818, \$449.** Report-links to Excel and a clean interface make this 2-D CAD software an excellent choice for use in mechanical engineering and construction. Plus, it's easy to learn. Mar 95

★★★★ **Macromedia FreeHand 5.0, Macromedia, 415/252-2000, \$595.** The new version of this venerable program has not only kept pace with the competition but has also added unique features of its own. Although the interface is more cluttered than ever, the wealth of new capabilities make this the drawing program to buy. May 95

★★★★ **MetaFlo', The Valis Group, 415/435-5404, \$595.** Graphics utility yields interesting visual effects with a minimum of fuss. It imparts elasticity to 2-D images, letting you push and pull collections of pixels while retaining the visual integrity of the image. Aug 94

★★★★ **MiniCad 5, Graphsoft, 410/290-5114, \$795.** Excellent CAD software for the Power Mac offers major performance for its price. It's admirably easy to learn. Nov 94

★★★★ **MovieFlo' 1.1, The Valis Group, 415/435-5404, \$899.** Tug, twist, and pinch your sister—or at least a digital image of her—with this special-effects program for stills or QuickTime movies. Alas, this well-designed application is hampered by a steep price and a poor manual. Jun 95

★★★★ **Painter 3, Fractal Design Corp., 408/688-8800, \$499.** Image-creation program has achieved a rare state of perfection, balancing enhanced conventional controls with spectacular effects packaged inside a tidy interface. It offers a new level of usability and genuine practicality. Apr 95

★★★★ **PhotoEnhancer 1.0, PictureWorks, 510/855-2001, \$129.** Nifty utility provides dozens of ways to improve the quality of QuickTake photos, from sharpening or softening focus to correcting over- or underexposed shots. Choose an image from a display of enhanced photos to speed the correction process. Apr 95

★★★★ **PhotoMatic 1.01 (2.0), DayStar Digital, 404/967-2077, \$199.** AppleScript-based utility lets you automate tasks in Adobe Photoshop 2.5.1 or later. Although it's limited, it can relieve you of some mundane chores. Nov 94

★★★★ **Pixar Typestry 2.1, Pixar, 510/236-4000, \$299.** With QuickDraw GX support, an approachable interface, a strong array of animation features, and outstanding image quality, this 3-D type-effects software is worth a try. It adds a new dimension to the way you look at type. Feb 95

★★★★ **PixelPaint Pro 3.01, Pixel Resources, 404/449-4947, \$379.** Color paint program strikes a good balance between the artistic demands of painting and the technical precision of image processing. New color-management capabilities are a plus for professional users. Mar 95

★★★★ **PixelPutty Solo, The Valis Group, 415/435-5404, \$349.** Affordable modeler lets you manipulate 3-D objects as if they were clay. It's a capable program, but a bare-bones interface and skimpy manual make it somewhat daunting for novices. Jun 95

★★★★ **Pointillist (2.0), Pictor GraFX, 310/865-0495, \$79.95.** Stereogram software creates images that look, at first glance, like random dots, but as you focus beyond the page, a 3-D image emerges from the pattern and appears to hover inches in front of the background. It's gleefully wacky. Jul 94

★★★★ **Ray Dream Designer 3.1.1, Ray Dream, 415/960-0768, \$349.** 3-D graphics program provides competent (if sometimes awkward) modeling tools, offers excellent surface-texturing capabilities, and produces high-quality ray-traced renderings. Mar 95

★★★★ **ScanPrepPro 1.2 (2.0), ImageXpress, 404/564-9924, \$695.** Adobe Photoshop add-on automates the scanning and image-messaging process and produces good results, although the program is somewhat unstable. Nov 94

★★★★ **Scenery Animator 1.0.4 (1.1), Natural Graphics, 916/624-1436, \$149.** Landscape rendering and animation software uses U.S. Geographical Survey



# Star Ratings

very data to create remarkably realistic 3-D representations of terrain. Its flaws are few, and our reviewer recommends it. Aug 94

★★★★ **Specular Collage 2.0.1, Specular International, 413/253-3100, \$399.** Practical image-compositing solution supplies a smooth interface and strong support for Adobe Photoshop 3.0. As long as you're willing to return to Photoshop to confirm your edits and make final changes, it's a serviceable tool. Feb 95

★★★★ **Terrazzo 1.0, Xaos Tools, 415/487-7000, \$199.** Turning a random group of pixels into a geometric pattern may not be everyone's consuming passion, but this plug-in graphic-effects module has definite appeal for a select niche of fabric, graphic, and video designers. Nov 94  
★★★★ **TextureScape 1.5, Specular International, 413/253-3100, \$195.** Algorithmic art program lets you manipulate and arrange PostScript shapes to create seamlessly repeating patterns. Like the best tools, it's simple enough to be fun and flexible enough to give you meaningful control. Feb 95

★★★★ **TypeTwister 1.0, Adobe Systems, 415/961-4400, \$29.99.** Inexpensive, easy-to-use, and fun type stylist lets you create wildly styled text effects, although it won't satisfy hard-core type manipulators. Jan 95

★★★★ **Virtus WalkThrough Pro 2.0, Virtus Corp., 919/467-9700, \$495.** Aside from occasional stumbles, this design tool is an exceptional program that lets you quickly and intuitively interact with your designs and gives clients the opportunity to visit and explore your creations before they are built. Apr 95

★★★★ **Vistapro 3.0, Virtual Reality Laboratories, 805/545-8515, \$149.95.** 3-D landscape rendering software uses digital versions of U. S. Geological Survey maps to create images and allows you to add external features such as buildings and rivers. Although it's a good program, it has some limitations. Feb 95

## MATH/SCIENCE

★★★★ **Chamber Works 1.0.2 (1.1), OnScreen Science, 617/776-6416, \$99.** Simulator for particle-physics events is the best introduction to particle physics yet produced, at a great price. Dec 94

★★★★ **JMP 3.0 (3.1), SAS Institute, 919/677-8000, \$695.** This statistics software can be used for a wide range of biological, chemical, and physical-science investigations. New features include floating tool palettes, an annotation tool for data tables, and an experimental-design module. Sep 94

★★★★ **Kekulé 1.1, PSI International, 410/821-5980, \$495.** Science software reads scanned chemical-structure drawings and interprets them, giving both a diagram for checking interpretation accuracy and a formal string representation of the structure. Nov 94

★★★★ **LabView for Mac 3.0.1 (3.1), National Instruments, 512/338-9119, \$1995.** For large-scale, demanding projects in data acquisition and analysis, this scientific software is an unchallenged standard. Jul 94

★★★★ **Maple V 3.0, Waterloo Maple Software, 519/747-2373, \$795.** If you prefer to do your own programming and function creation, you'll benefit from this symbolic mathematics software's efficient use of your Mac's resources. This version hits most of the points on your symbolic-math wish list. Oct 94

★★★★ **MATLAB 4.1 (4.2c), The Math Works, 508/653-1415, \$1695.** Relatively expensive numerical math software has added nearly 100 new graphics commands, improved its treatment of sparse matrices, and added commands for sound processing. Its toolboxes make it

a first choice for many applied-science specialties. Nov 94

★★★★ **MLab, Civilized Software, 301/652-4714, \$1495.** Mathematical-modeling software lets you do fast computation on numerically complex real-world problems, using an ancient Mac II or higher. You must be willing to write short programs, but professional researchers will find it a rewarding choice. Apr 95

★★★★ **Spyglass Plot 1.0 (1.01), Spyglass, 217/355-6000, \$295.** This scientific-charting software is the first choice for serious large-set plot crunching. Oct 94

★★★★ **Statistica/Mac 4.1, StatSoft, 918/583-4149, \$695.** At present, this statistical software is the undisputed features-per-dollar champion in the Mac market. Mar 95

★★★★ **SuperScope II 1.25 (1.4), GW Instruments, 617/625-4096, \$1490.** Despite a relatively small instrument library, this laboratory data-acquisition software effectively covers a wide range of needs, and learning to use it won't become your life's work. Oct 94

★★★★ **Survival Tools 1.0 (1.1), Abacus Concepts, 510/540-1949, \$295.** The combination of survival analysis with the StatView template systems gives you a virtual actuary-in-a-box. It's a great set of tools, conveniently packaged. Feb 95

## ORGANIZATION/PRODUCTIVITY

★★★★ **ACT 2.0, Symantec Corp., 503/334-6054, \$249.95.** Contact manager's file-level compatibility with DOS and Windows and its complete contact management make it worth considering if you can live with its weak scheduling functions. Mar 95

★★★★ **Arrange 2.0, Common Knowledge, 415/325-9900, \$349.** If your needs fall beyond the usual calendar and address-book functions, this personal information manager is a strong contender. It now has more calendar functions and print options. Dec 94

★★★★ **Claris Organizer 1.0 (1.0v2), Claris Corp., 408/727-8227, \$99.** New personal information manager users, lured by the low price, good performance, and ease of use of this product, will find that it meets their needs. Most longtime PIM users won't be tempted to switch. Jan 95

★★★★ **ClientTrac 2.0, Whiskey Hill Software, 415/851-8702, \$99.** It's easy to enter contact information, but this PIM is slim on speed, features, and flexibility. May 95

★★★★ **DateBook & TouchBase Pro Bundle 4.0, Adobe Systems, 415/961-4400, \$89.99.** Personal information manager package is now easier to use and offers many new features. The excellent linking between contacts and calendar is the most significant feature. Sep 94

★★★★ **DateView 1.0.1 (1.0.2), Prairie Group, Inc., 515/225-3720, \$69.95.** If you're willing to sacrifice some features to get simplicity and speed, this calendar-to-do manager makes sense. It integrates with the contact manager, InTouch. Aug 94

★★★★ **Day-to-Day Organizer 1.0, Portfolio Software, 802/434-6400, \$149.95.** The address-book and outlining components of this organizer are great, but overall, it's a mixed bag. The calendar interface and the way it handles recurring events need to be improved. May 95

★★★★ **Dynodex for Macintosh 3.5 (3.5.2), Portfolio Software, 802/434-6400, \$69.95.** Although this program doesn't currently link to a calendar, it is an excellent contact manager. This upgrade has a few new features, improved performance, and an easier-to-use interface. Sep 94

★★★★ **Expresso 1.0, Berkeley Systems, 510/540-5535, \$69.99.** The just-the-basics approach of this calendar and address book might be just fine for people who don't need the feature set of other calendar programs and enjoy its graphics. Apr 95

★★★★ **FastPace Instant Contact 1.0 (1.1), Attain Corp., 617/776-1110, \$39.99.** Although this contact manager could use a few additional features—especially a menu-bar search function—it does a capable job, and it is intuitive and easy to use. Jan 95

★★★★ **First Things First Proactive 1.1, Visionary Software, 503/246-6200, \$149.** Capable scheduling program has some convenient features. It's worth a look if you don't have to share information with a contact manager. Nov 94

★★★★ **In Control 3.0.4 (3.0.7), Attain Corp., 617/776-1110, \$85.** Excellent to-do-list manager and outline, coupled with a good calendar is a strong choice if you live and die by to-do lists. Oct 94

★★★★ **Now Contact and Now Up-to-Date 3.0, Now Software, 503/274-2800, \$99.** Taken together, this contact manager and calendar provide a set of solid, reliable tools for keeping your life in order. Users who need to share information over a network may find it close to ideal. Apr 95

★★★★ **Peanuts Family Organizer 1.0, Individual Software, 510/734-6767, \$19.95.** "Hey, Pop, can I borrow the car Saturday night?" "Look at the family PIM and check my calendar, Son." This organizer's endearing interface doesn't make up for missing or poorly implemented features. Jun 95

★★★★ **Souvenir 2.2, ComposeTel, 415/327-0744, \$49.** While this contact manager is fast and simple, it's hard to recommend it when you can buy integrated contact managers and schedulers for about the same price. Dec 94

★★★★ **TimeSquare 1.0 (1.0.6), Team Building Technologies, 514/278-3010, \$149.** Fast, flexible, network calendar program has lots of handy features, but it's missing a few as well, such as multiday events and label grouping. Aug 94

## PRESENTATION TOOLS

★★★★ **Adobe Premiere 4.0 (4.0.1), Adobe Systems, 415/961-4400, \$795.** Video-editing software for the Power Mac remains as solid and reliable as previous versions, and also advances far and above its competitors with new and improved professional-level features. With the right hardware, it can give desktop-video editors broadcast-quality products with a minimum of compromises. Dec 94

★★★★ **Amazing Animation 1.0, Claris Corp., 408/727-8227, \$49.** Cute pictures, funny sounds, and a kid-friendly interface come together in this package that lets children produce short animations or interactive presentations. The canned animations and scenes grow tiresome, however. Jan 95

★★★★ **Animation Master 2.0.5 (2.09), Hash Inc., 206/750-0042, \$699.** Although this animation software packs extraordinary power at a reasonable price, it's difficult to learn and prone to instability. Oct 94

★★★★ **Electronic Marker 1.0.2, Consumer Technology Northwest, 503/643-1662, \$34.95.** This annotation tool can be a practical enhancement to live demonstrations and on-screen presentations, but it needs better controls for modifying and preserving markup layers. May 95

★★★★ **HyperCard 2.2, Apple Computer, 408/**



**996-1010, \$249.** Authoring tool strikes a good balance between power and ease of use, and its price is reasonable. It may not satisfy all your wishes, but it should keep you happily building stacks. Sep 94

★★ **Living Album 2.5, QuickMedia Labs, 408/749-9200, \$129.95.** A crowded interface detracts from the usefulness—and aesthetics—of this multimedia album. May 95

★★★★ **Macromedia Director 4.0 (4.04), Macromedia, 415/252-2000, \$1195.** Although this multimedia program remains far from easy to use, this admirable upgrade increases the program's power and improves its interface. Multimedia professionals will continue to find it the best package available. Sep 94

★★★ **Microsoft PowerPoint 4.0, Microsoft Corp., 206/882-8080, \$339.** If you're in the market for a presentation-graphics program, this is a good choice to use along with Word or Excel, as long as you don't mind the lack of animation functions. For general purposes, though, other alternatives have the edge. Feb 95

★★ **MovieWorks 2.0.2, Interactive Solutions, 415/377-0136, \$295.** With diligence you can get decent results with this all-in-one QuickTime-based multimedia package. But other entry-level programs make leaping into multimedia easier and more rewarding. Sep 94

★★ **mPower 2.0, Multimedia Design Corp., 704/523-9493, \$295.** Despite a handful of sophisticated multimedia features, this authoring tool is too limited to be compelling. While its push-button interface is easy to understand, it's far too cumbersome. Apr 95

★★★ **The Multimedia Workshop, Davidson & Associates, 310/793-0600, \$79.95.** Children or adults can use this media-integration tool without big investments of either time or money. It's full of compromises, though, such as the inability to layer narration over music. Nov 94

★★★★ **Persuasion 3.0, Adobe Systems, 206/622-5500, \$495.** Users have plenty of new features to cheer about, including improved tool palettes, extensive charting options, and hypertext functions with this presentation graphics program's upgrade. High memory and disk-space requirements are drawbacks. Sep 94

★★★★ **Presenter Professional 3.0, VID, 818/358-3936, \$1995.** The improved interface, enhanced animation module, and reduced price of this 3-D modeling and animation package make it an excellent choice for multimedia producers. The new audio features are especially appealing. May 95

★★★★ **SoundEdit 16, Macromedia, 415/252-2000, \$379.** Digital audio software supports 16-bit sound and has enough goodies to earn it a place in a multimedia producer's toolbox. But its lack of record-level controls limits its usefulness as a professional audio tool. Dec 94

★★ **Special Delivery 2.0, Interactive Media Corp., 415/948-0745, \$399.** Multimedia authoring tool can be confusing and isn't the best choice for complex projects. Still, it may save hours of training for users who merely need to create simple presentations. Apr 95

★★★★ **SuperCard 1.7.1 (2.0), Allegiant Technologies, 619/587-0500, \$495.** Multimedia authoring system adds a few welcome enhancements and squashes some old bugs. For current users, the upgrade is well worth the price; for others, it's an excellent alternative to more expensive authoring systems. Feb 95

## PROGRAMMING

★★★★ **IDL 3.5 (3.6), Research Systems, 303/786-9900, \$1500.** In this shockingly powerful,

compact, graphics-oriented, interpreted language, a single command is worth a page of C-language code. If you're an image processing professional, you should consider adding IDL to your tool kit. Oct 94

★★ **ScriptWizard 1.0, Full Moon Software, 408/253-7199, \$99.** Software attempts to make writing and debugging AppleScript scripts easier but doesn't offer enough improvement over Apple's Script Editor. Jan 95

★★★★ **VIP-C 1.5 (1.5.1), Mainstay, 805/484-9400, \$495.** For convenience in producing 680X0/Power Macintosh applications, this programming utility is a fine investment. Intermediate to advanced users will get the most benefit, but even beginners will find that it helps turn student projects into serious apps. Feb 95

## UTILITIES

★★ **Apple Personal Diagnostics 1.0 (1.1), Apple Computer, 408/996-1010, \$129.** In trying to make a hardware tool for the rest of us, Apple has come up short. This hardware-diagnostics utility has an uneven manual, some less than thorough tests, and a surprisingly unsatisfying interface. Nov 94

★★★★ **Automap Road Atlas for Macintosh 2.01 (2.04), Automap, 206/455-3552, \$99.95.** Mapping software tells you how to get where you're going better than any other map or software our reviewer has seen. Although screen redraw is slow, it's worth it for the written directions and maps. Jul 94

★★★★ **Cal 1.0, Thought I Could, 212/673-9724, \$79.95.** Well-chosen set of desktop necessities includes an excellent calculator, an associated-formula editor, a datebook, and a calendar. Due to its easy access and ample power, this software has become an everyday tool for our reviewer. Jan 95

★★★★ **CanOpener 3.0, Abbott Systems, 914/747-4171, \$125.** You can use this handy utility to open many types of files—which can be a lifesaver if you don't have the application a file was created in—but it falls a little short in the file-search department. May 95

★★★★ **Conflict Catcher II 2.1.1, Casady & Greene, 408/484-9228, \$79.95.** Customizable, fast, and safe extension-management utility goes well beyond the basics. For Power Macintosh users, it even tells which extensions aren't written in native code and are likely to slow down Power Macs. Oct 94

★★★★ **Disc-To-Disk, Optical Media International, 408/376-3511, \$199.** Audio-capture utility's friendly interface provides a simple way to transfer sound from a CD to the Mac's hard drive. A useful tool for multimedia authors. Jun 95

★★★★ **DiskGuard 1.0.1 and DiskGuard Remote, ASD Software, 909/624-2594, \$129 to \$799.** Rock-solid, flexible disk-protection tools are worth serious consideration if your Mac or Macs are accessible to other users. The remote version (which comes in five- and ten-user packs) adds network features, including clock synchronization. Mar 95

★★★★ **DiskTop 4.5 (4.5.2), Prairie Group, Inc., 515/225-3720, \$69.95.** Organizing a crammed hard drive becomes a more manageable task with this simple but powerful file-management utility that lets you copy, move, rename, delete, and find files—without using the Finder. Jul 94

★★★★ **DragStrip 1.0, Natural Intelligence, 617/876-4876, \$39.95.** Icon-based file and folder organizer brings a semblance of order to your cluttered desktop. But your troubles aren't over unless a future version lets you label folders. May 95

★★★★ **Drive7 3.0 (3.09), Casa Blanca Works, 415/461-2227, \$89.95.** Highly recommended hard drive-formatting utility easily formats and partitions most drives and provides all the options you need. And within its limitations, its Mount Cache utility provides a real performance boost. Nov 94

★★★★ **eDisk 2.0, Alys Software Corp., 415/928-2895, \$149.95.** Driver-level software compresses data read to your drive on the fly and automatically expands data read from your drive. It offers transparent compression. Dec 94

★★★★ **Graffiti 1.01, Palm Computing, 415/949-9560, \$79.** If you can't seem to teach Newton your handwriting, you can teach yourself a new writing system that Newton can handle. Kind of makes you wonder who's running the show, but it works. May 95

★★★★ **Icon Mania 1.0 (1.02), Dubl-Click Software, 503/317-0355, \$69.95.** Delightful icon-editing utility comes with terrific tools for building new icons, including an outstanding thumbnail feature that builds custom icons from graphics files. Aug 94

★★★★ **Kaboom 3.0, Nova Development Corp., 818/591-9600, \$49.95.** Sound-effects utility with sound-editing application is a fun program for anyone who wants to play with sound. Feb 95

★★★★ **Launch Pad 1.0, Berkeley Systems, 510/540-5535, \$49.99.** If you want to share your Mac with your kids, this desktop utility is a worthwhile investment. It can even speak menu items and file names out loud for kids too young to read. Jan 95

★★★★ **MacTools Pro 4.0, Symantec Corp., 503/690-8090, \$149.95.** This utility does a good job of diagnosing and fixing disk problems, but suffers from large RAM requirements and expensive technical support. May 95

★★★★ **Maxima 3.0, Connectix, 415/571-5100, \$99.** If you have more than 8MB of RAM, you can use some of it as a RAM disk, speeding up disk-based operations, with this inexpensive utility. Nov 94

★★★★ **MultiClip Pro 3.1, Olduvai Corp., 305/670-1112, \$59.** Easy-to-use utility is exactly what Apple's Clipboard and Scrapbook should have been; a convenient repository of data that moves between documents without fuss or muss. Apr 95

★★★★ **Norton DiskDoublerPro 1.1, Symantec Corp., 503/334-6054, \$109.** Utility collection includes DiskDoubler, AutoDoubler, and CopyDoubler. Because of its ease of use, the product is a good choice for beginners. Feb 95

★★★★ **Norton Utilities for Macintosh 3.1, Symantec Corp., 503/334-6054, \$149.95.** Data-protection and -recovery utility collection is leaner, meaner, and faster than ever before, but it's also surprisingly uneven. While Disk Doctor leads the pack for disk-repair utilities, the back-up module is weak and the new UnErase module is missing some features. Feb 95

★★★★ **Now Utilities 5.0, Now Software, 503/274-2800, \$89.** Three of the modules of this fine-tuned, interlocking utility set—Now FolderMenus, Now Menus, and Now SuperBoomerang—are almost indispensable, and while the other six may not be tops in their category, they're well worth considering. As a collection, this package remains the best in the business, and it's Power Mac native. Jan 95

★★★★ **PaperPower 1.0, Piptel, 513/294-6656, \$149.** Graphics-tablet utility provides a useful tool for creating and using macros, but the overlays it creates can be tricky to use. Apr 95

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# Star Ratings

★★★ **Peirce Print Tools 1.0, Peirce Software, 408/244-6554, \$129.** Nine handy printing utilities work with QuickDraw GX. Most of the modules are useful, but not all are must-haves. Jan 95

★★★ **PopupFolder 1.0 (1.5.1), Inline Software, 617/935-1515, \$59.95.** Finder utility is so handy and easy to use, you wonder why it isn't built into the Mac's system software. On the other hand, it's sluggish when readying pop-up menus for every folder. Aug 94

★★★★ **PowerAgent 1.1 (2.0), SouthBeach Software Corp., 305/942-0605, \$159.** You can revolutionize your Macintosh work with this agent program that manages scripts. It provides excellent support for FileMaker Pro. Nov 94

★★★★ **PowerMerge 2.0, Leader Technologies, 714/757-1787, \$129.** Powerful file-management tool helps you keep individual files, folders, or entire volumes organized and up-to-date. This version lets you compare and launch documents, rename files, trash superfluous files, and lots more. Aug 94

★★★ **ProFiles 1.0, Dayna Communications, 801/269-7200, \$129.** Unusual new utility lets you group related files and folders for quick access and actions such as making aliases, copying, and more. Aug 94

★★★ **RescueTxt 1.0, Abbott Systems, 914/747-3116, \$79.** If you want decent performance and the ability to locate text in even a deleted file, this text-retrieval utility is a good choice. It doesn't tell you what file the text comes from, however, so you cannot simply open the found file. Apr 95

★★ **SCSI Director Pro 3.0.6 (3.1.1), Transoft Corp., 805/565-5200, \$99.** Utility provides simple, one-button hard disk formatting, but when it comes to doing some of the fancy tricks, the going gets rough and technical support costs \$1.90 per minute. Sep 94

★★★★ **Square One 2.0 (2.0.1), Binary Software, 310/449-1481, \$74.** The slick design, flexibility, and straightforward interface of this file-launching utility make it a pleasure to use. Dec 94

★★★ **Stop & Go 4.0, Engram International, 415/455-1100, \$69.99.** File-protection/relaunch utility uses a portion of your hard disk to save a snapshot of the data in your Mac's RAM. It's fast, and it relaunches files, applications, and extensions in a single, unified process, but it's unduly complicated. Oct 94

★★★★ **TypeTamer 1.0.4, Impossible Software, 714/470-4800, \$59.95.** Versatile font utility provides information on installed fonts and simplifies tasks such as typing special characters and reselecting fonts from the menu. May 95

★★★★ **Virex 5.5.1, Datavatch Corporation, 508/988-9700, \$99.95.** Comprehensive, reliable, and speedy utility helps protect your files from those misguided lads who get their jollies by releasing viruses. To keep it current, updates are available on online services. May 95

★★★★ **VirtualDisk 1.1a (2.02), Continuum Software, 503/848-7112, \$79.** Rapid disk cataloging; fast, efficient label-printing; and an excellent disk-copy utility make this software a wonderful value. Jul 94

## VERTICAL MARKETS

★★★ **Autoscore 1.0, Wildcat Canyon Software, 510/527-5155, \$150.** Converting the human voice into MIDI note information is a challenging task. If you have the right music software, mike, and voice, this music-recognition software can actually pull it off. Feb 95

★★★ **Bird Brain 2.01, Ideaform, 515/472-7256, \$99.95.** Database lets bird watchers record every

sighting of every bird they have ever seen to create electronic life lists. Although it can be slow, it includes species names and other information. Jan 95

★★★ **ConcertWare 1.5.7, Jump Software, 415/917-7460, \$159.** Although it lags behind the competition in performance and features, this music-notation program's low price and ease of use make it a viable choice for the budget-wise. Jun 95

★★★ **DigiTrax 1.1, Alaska Software, 408/738-3320, \$349.** If you're an amateur musician or a multimedia producer with modest sound-recording needs and you have a Quadra AV, consider this audio-recording software. What it lacks in features, it makes up for in simplicity and a relatively low price tag. Mar 95

★★★ **ErgoKnowledge 1.0, Visionary Software, 503/246-6200, \$395.** Despite a few shortcomings, this CD-ROM offers a good, basic review of office-computer ergonomics. Dec 94

★★★ **MayaCalc 2.3.1 (2.3.3), Ecological Linguistics, 202/546-5862, \$120.** 4th Dimension database alleviates much of the pain involved in working with the complex, multilayered Maya calendar. Although the design could be improved, it's a highly useful tool for both serious and casual Maya enthusiasts. Feb 95

★★★★ **Maya Hieroglyphic Fonts, Ecological Linguistics, 202/546-5862, \$10 to \$60 per set.** Although these fonts based on Mesoamerican hieroglyphic scripts are beautifully rendered, the character spacing is sometimes uneven. Feb 95

★★★★ **Mayo Clinic Family Health Book, IVI Publishing, 612/996-6000, \$69.95.** Medical CD-ROM for home use deals with the full gamut of health-care topics, from AIDS to zygotes, although it doesn't include any reference to alternative therapies. Sep 94

★★★ **Mayo Clinic: The Total Heart 1.0, IVI Publishing, 612/686-0779, \$21.75.** Cardiovascular health and related subjects are the topics of this medical CD-ROM for home use. Although it makes liberal use of drawings, photographs, and animations, video sequences would have been more effective. Sep 94

★★★ **Medical HouseCall 1.0, Applied Medical Informatics, 801/464-6200, \$99.95.** Interactive medical guide is a painless way for people to learn about diseases, tests, and therapies. Although it's easy to use and interesting, some images were incorrectly labeled. Feb 95

★★★ **MusicTime 2.0 (2.0.1), Passport Designs, 415/726-0280, \$149.** Music-notation program is geared for hobbyists and students. If your needs aren't complex, it may fit the bill, at a great price. Oct 94

★★★★ **Overture 1.02, Opcode Systems, 415/856-3333, \$495.** Easy-to-learn, midrange notation software has a friendly interface and shows real polish. If you don't need all the features of a high-end product, it's a serious contender. Apr 95

★★★ **Performer 5.02, Mark of the Unicorn, 617/576-2760, \$495.** A colorful, redesigned interface and improved sheet-music view are just part of this MIDI recording program's worthwhile overhaul. If you like the sheet-music view, this is the product to buy. Mar 95

★★★★ **Practica Musica 3.0 (3.1), Ars Nova Software, 206/889-0927, \$140.** Music-teaching program, with emphasis on sight-reading and ear-training techniques, shines as a smart, infinitely patient personal music coach in the classroom. Jan 95

★★★ **Route 66 1.5, Route 66 Geographic Information Systems B.V., 415/957-0666, \$79.95.** Jack Kerouac could have saved a lot of time if he'd used this route planner (unless he was planning to drive to Alaska, which isn't included). It's fast, but omits some cities

and can't handle more than three destinations at a time.

May 95

★★★ **SAM-CD, Scientific American Medicine, 212/754-0550, \$395.** Despite a few shortcomings, such as the poor interface for case simulations, this medical reference work—a popular series of publications covering topics in clinical medicine—should prove a worthwhile addition to any medical library. Sep 94

★★★ **Vision 2.08, Opcode Systems, 415/856-3333, \$495.** MIDI program's list of exclusive, creativity-slanted features, such as endless count off and scrubbing (which lets you hear the music as you drag across it), give the program a usability edge. Mar 95

## WRITING TOOLS

★★★★ **Bookends Pro 3.1, Westing Software, 415/435-9343, \$129.** Comprehensive database program catalogs and stores all of your reference material—actual quotes as well as citations. It's a useful tool that researchers will appreciate. Mar 95

★★★★ **EndNote Plus 2.0, Niles & Associates, 510/649-8176, \$299.** Despite its power, this indispensable bibliography and citation manager is surprisingly easy to learn and use. If you have to work with references, it's a good choice. Apr 95

★★★ **FullWrite 2.01, Akimbo Systems, 617/776-5500, \$395.** As the leanest of all high-end word processors, this product requires only 2MB of RAM. Although its modular architecture is complex, it's worth considering if you don't need to share files with the Word/WordPerfect crew. Apr 95

★★★ **Grammatik 6 for Macintosh, Novell, 801/225-5000, \$49.95.** The low price, pleasant interface, and improved accuracy of this grammar checker make it worthwhile for a large number of quality-driven writers. It still misses some errors. Feb 95

★★★ **Inspiration 4.1, Inspiration Software, 503/245-9011, \$195.** Writing tool allows you to move between words and diagrams to show the relationships between ideas. This version adds improved keyboard controls, import and export capability, plus more. Apr 95

★★★ **Microsoft Word 6.0, Microsoft Corp., 206/882-8080, \$339.** If you can put this word processor's new features—including cross-referencing, AutoText, automatic numbering, macros and more—to work and you have a Quadra 650 or faster Mac, take the plunge. If you have a slower 68040 Mac, think twice; and if you have a 68030 Mac, don't even think about it. Feb 95

★★★ **Nisus Writer 4.0, Nisus Software, 619/481-1477, \$495.** In a few specialized areas—such as mixing English and non-Romance languages, this word processing program is unmatched. However, for some high-end uses, such as table creation, it's a poor choice. Mar 95

★★ **Read-It O.C.R. Pro 5.0, Olduvai Corp., 305/670-1112, \$395.** Although this OCR software has a nice collection of features, its recognition engine isn't up to par. It's not a first choice unless you simply need to process piles of very clear Courier text. Apr 95

★★★ **TextBridge 2.0, Xerox Imaging Systems, 508/977-2000, \$99.** Optical character recognition software is impressive on good documents and can be trained and automated. You won't find that anywhere else at this price. Sep 94

★★★ **Writing Coach 1.0, WritePlace Software, 503/484-6380, \$89.** If you'd like help with your writing, this writing-skills tutorial could be a great investment. Skillfully worded worksheets assist with planning, organizing, and revising. Dec 94



## Hardware

### INPUT DEVICES

★★★★ **ArtPad, Wacom Technology, 206/750-8882, \$199.** Measuring less than 7 by 7½ inches, this pressure-sensitive tablet is sheer convenience if you're looking for a device that you can hide away one moment and readily exhumate the next. Apr 95

★★★★ **DrawingSlate II, CalComp, 602/948-6540, \$395.** A responsive stylus and user-definable macros make this digitizing tablet an excellent choice for artists and illustrators. Jun 95

★★★★ **Ear Phone Streamline AV, Jabra Corp., 619/622-0764, \$169.** As a hands-free telephony tool—and as a replacement for the Apple PlainTalk microphone—this telephone/speech-recognition earpiece is a winner. Its biggest drawback is that you can't hear other Mac sounds when it's plugged in. Jul 94

★★★★ **FlightStick Pro for Macintosh, CH Products, 619/598-2518, \$129.95.** The authentic look and feel of this joystick, along with well-conceived software, make it a nearly perfect desktop pilot's companion. Dec 94

★★★★ **Mac Keyboard Deluxe, MicroSpeed, 510/490-1403, \$125.** If you're in the market for a new or replacement keyboard, this one, which is both smaller and lighter than Apple's Extended Keyboard, is worth considering. It has four ADB ports. Nov 94

★★★★ **Mouse Deluxe Mac, MicroSpeed, 510/490-1403, \$69.** The extra buttons of this mouse offer several features that Apple's mouse doesn't match, but its shape may not suit everyone's taste. Mar 95

★★★★ **PaperPort, Visioneer, 415/812-6400, \$399.** The paperless office is actually here. This clever combination of elegant hardware and intelligent software makes it easy to capture, organize, and retrieve documents. Once a page is scanned in, you can annotate it; run it through OCR software; or print, fax, or E-mail it. May 95

★★★★ **QuePoint, MicroQue, 801/263-1883, \$149.** Tired of shoving a mouse around? Slide your finger across this tiny input device to manipulate the cursor with a minimum of movement. May 95

★★★★ **Remote Point, InterLink Electronics, 805/484-1331, \$199.** Although it may not be a first choice for desktop work, this infrared pointing device is an elegant workaround for users who don't want to (or can't) be tethered to their Macs. Apr 95

★★★★ **Thinking Mouse Macintosh ADB, Kensington Microwave, 415/572-2700, \$139.95.** A mouse is a mouse is a mouse. Not so. This one has four programmable buttons that you can use—with the accompanying software—to automate such tasks as selecting commands or typing text. May 95

### MISCELLANEOUS HARDWARE

★★★★ **AirNote 1.0 (1.1), Notable Technologies, 510/208-4400, \$299.** Remote-messaging service lets you originate alphanumeric paging messages from your own computer, eliminating both dictation charges and errors in translation. It's a very handy way to get into alphanumeric paging. Dec 94

★★★★ **Apple PCMCIA Expansion Module, Apple Computer, 408/996-1010, \$219.** Well-integrated, well-designed unit offers 500-series users an efficient and easy albeit expensive way to add features to their PowerBooks. If you can overlook the early-adopter prices (a big if),

the PC Cards are great expansion options—lightweight, low-power, and high-performance. Mar 95

★★★★ **Colotron, Light Source Computer Images, 415/925-4200, \$1195.** Getting the colors on your screen to match those in your printed output is now easy and affordable, thanks to this hand-held spectrophotometer, which measures both transmissive and reflective sources. Jun 95

★ **EAB401P Speakers, Panasonic Communications & Systems, 800/742-8086, \$99.** Small, inexpensive speakers provide less-than-state-of-the-art performance. The audio is thin and reedy. Apr 95

★★ **EAB701P Speakers, Panasonic Communications & Systems, 800/742-8086, \$249.** The sound of these speakers is thin and slightly harsh, although they are attractive in a high-tech sort of way. Apr 95

★★★★ **IX-4015 Color Image Scanner, Canon Computer Systems, 714/438-3000, \$1169.** The price of this color flatbed scanner is competitive, and its speed and excellent bundled software make it easy to use and a good choice for the small office. Jul 94

★★★★ **MMS557, Audio-Technica USA, 216/686-2600, \$149.95.** Among a huge selection of similarly priced speaker systems, these stand out as a best buy. They look good, as well as sound good. Apr 95

★★★★ **MultiSpin 4Xe, NEC Technologies, 708/860-9500, \$515.** With its competitive price, free tech support, and two-year warranty, this quad-speed CD-ROM player is ready to race. Feb 95

★★ **NEC AudioTower, NEC Technologies, 800/632-4636, \$99.** Looks great; sounds mediocre. Although this speaker system provides a convenient jack for an external CD drive, the sound quality is nothing to shout about. May 95

★★★★ **Photo Engine, Radius, 408/541-6100, \$1099.** Photoshop acceleration hardware's suite of four 66MHz 32-bit DSP chips offers sufficient processing power to speed up 25 Photoshop functions on the most sophisticated systems, including Power Macs. Feb 95

★★★★ **Reno Portable CD-ROM Player, MediaVision, 510/770-8600, \$349.** Have CD-ROM, will travel. This portable player is lightweight, versatile, and easy to set up; about the only complaint is its short battery life. Jun 95

★★★★ **SCSI Sentry, APS Technologies, 816/483-6100, \$79.95.** Although the price of this terminator may seem steep, this device may well be the cure for SCSI woes. Our reviewer heartily recommends it. Sep 94

★★★★ **TurboDialer, Micromachines, 818/901-1700, \$69.95.** Automatic telephone dialer is a well-executed product, except for occasional computer noise that seeps into phone conversations. Jul 94

★★★★ **Vivace, Coda Music Technology, 612/937-9611, \$2295.** As an intelligent and endlessly patient accompanist, this music study system for wind instruments may be the best thing that's happened to learning wind literature since the metronome. Jan 95

### MODEMS/NETWORK HARDWARE

★★ **Cooperative Adapter, Photonics Corp., 408/955-7930, \$449.** The high cost of each unit, the limitations and restrictions inherent in diffuse infrared, and the extremely low cost of traditional LocalTalk adapters and cabling make this infrared network interface an expensive niche product. Dec 94

★★★★ **DaynaPort Pocket SCSI/Link, Dayna Communications, 801/269-7200, \$299 to \$369.** Inexpensive, lightweight SCSI-to-Ethernet connector works

with both desktop Macs and PowerBooks and can use the Mac's ADB port as a power source. Nov 94

★★★★ **FastSwitch 10, Grand Junction Networks, 510/252-0726, \$6250.** Switched Ethernet hub is a great solution for networks that handle large amounts of data traded peer-to-peer, but if your network consists of E-mail and a file server, you probably won't see much benefit in stepping up to switched Ethernet. Dec 94

★★★★ **OneWorld Fax, Global Village Communication, 408/523-1000, \$999.** Easy-to-use network fax product lets an office share fax-sending resources without dedicating a hard drive and CPU. Aug 94

★★★★ **OneWorld Internet 1.0, 700 Series, Global Village Communication, 408/523-1000, \$1699 plus monthly fee.** Users of an office network can connect to the Mother of All Networks with this Internet gateway. It offers E-mail and direct Internet access in an approachable format. Jun 95

★★★★ **Pocket EtherTalk Adapter, Xircom, 805/376-9300, \$349 to \$399.** All-in-one SCSI-to-Ethernet connector is lightweight and works with desktop Macs and PowerBooks. Nov 94

★★★★ **PowerPort Mercury/PB 500 Series, Global Village Communication, 408/523-1000, \$399.** Top-notch internal fax modem for 500-series PowerBooks is capable of exemplary fax and data communications performance. Nov 94

★★★★ **Spectra-Com P192mx, Bay Connection, 408/270-8070, \$169.** If you must have absolute portability and AC power isn't available, this pocket data/fax modem can do the job. It's not that much smaller than a regular desktop modem, however. Oct 94

★★★★ **SupraFaxModem 288, Supra Corp., 503/967-2410, \$274.95.** This 28,800-bps fax modem is a very good performer, and the price of admission isn't steep. Combined with fast, stable fax software and a good terminal program, it's hard to beat. Aug 94

★★★★ **Watermark Message Central 2.0.2 (3.0), High Tide Software, 510/704-9927, \$499.** If you're willing to put in a lot of effort, you'll find this highly sophisticated voice-mail system supremely flexible. It includes a specially modified modem with voice chip, as well as fax software and telecommunications software. Jul 94

### PRINTERS

★★★★ **Apple Color StyleWriter 2400, Apple Computer, 408/996-1010, \$525.** Economical, QuickDraw-based color ink-jet printer offers gorgeous color output plus fast black-and-white printing. If you don't need DOS/Windows compatibility, it's a good buy. Apr 95

★★★★ **LaserWriter 16/600 P5, Apple Computer, 408/996-1010, \$2399.** If speed is what you need, this fine printer is it. The price is reasonable. Mar 95

★★★★ **P-Touch PC, Brother International Corp., 908/356-8880, ext. 4307, \$449.95.** Versatile label printer is easy to set up and use, and produces high-quality output. The cost per label is high, though, and the documentation is weak. Sep 94

★★★★ **Phaser 140, Tektronix, 503/627-7111, \$1695.** If you're looking for a capable color printer for a small workgroup, this ink-jet is a great choice. It provides only 17 resident fonts, however. Apr 95

★★★★ **PowerPrint 2.5 (2.5.2), GDT Software, 604/291-9121, \$149.** Ingenious hardware-software combo lets the Mac print to almost any PC printer. It supports over 1000 printers—from aging dot matrix models to the newer color ink-jet and laser printers. Sep 94

*continues*



# Star Ratings

★★★ **PrimeraPro, Fargo Electronics, 612/941-9470, \$1895.** The photo-realistic output of this thermal-wax and dye-sublimation printer beats that of any other printer in the price range. But with expensive consumables and slow print time, it's best suited for routine thermal-wax use and occasional dye-sub work. Jan 95

★★ **QMS ColorScript Laser 1000, QMS, 205/633-4300, \$6999.** Color laser printer succeeds in combining the versatility of monochrome laser printing with attention-getting color, but if you don't need to chase rainbows right away, you might wait and see if competition drives capabilities up. Jul 94

★★★★ **Stylus Color, Epson America, 310/782-0770, \$699.** This color ink-jet printer is no speed demon at 720-dpi resolution, you need special paper for hires output, and it offers no color correction. But who cares? The print quality is superb and the price is reasonable. May 95

## SCANNERS

★★ **Pro Imager 4000, PixelCraft, 510/562-2480, \$2995.** This midrange scanner delivers excellent highlight detail but produces a lot of noise in shadow areas. It doesn't measure up to similarly priced competitors in speed or image quality. Jun 95

★★★★ **Pro Imager 8000, PixelCraft, 510/562-2480, \$12,995.** Demanding prepress users will like this scanner's tonal sensitivity, high resolution, large image area, and impressive speed. Although its color-adjustment software needs work, this is a superb scanner. Jun 95

★★★ **Reli 4830T, Relisys, 408/945-9000, \$1699.** The good: high-quality scans, midrange price; lots of bundled software. The bad: slow performance, quirky scanning software. The upshot: If you can live with the cons, this scanner is a bargain. Jun 95

★★★★ **SprintScan 35, Polaroid, 617/386-2000, \$2495.** Compact, efficient scanner offers a cost-effective way to transfer images from 35mm slides or negatives to a Mac. Jun 95

## SYSTEMS/STORAGE

★★★★ **Alacrity PM 6100, KS Labs, 614/374-5665, \$165.** Installing a clock booster is the quickest, easiest, and cheapest way to extract more power from Apple's entry-level Power Mac. Oct 94

★★★★ **Brainstorm Accelerator for the Macintosh SE, Brainstorm Products, 415/988-2900, \$199.** Your SE will never be a Power Mac or even a IIx, but if your budget won't buy a new Mac, you can't do better than this accelerator, which pushes an SE's speed to close to a Classic II's in overall performance. Mar 95

★★★ **Conley SR2 RAID System, Conley Corp., 212/682-0162, \$21995.** While RAID technology is typically praised for its fault-tolerance rather than its speed, this high-performance storage system proves that you can have both. For critical tasks requiring redundancy and round-the-clock operation, this is one of the best systems shipping. Sep 94

★★★ **Joule System, La Cie, 503/520-9000, Price varies by component.** Plug-and-play tower lets you stack drives—including hard drives, removable media, and other modules—atop a base unit, making it easy to buy extra storage or swap modules with other Joule towers. Joule drive prices are generally slightly higher than for comparable drives, however. Feb 95

★★★★ **Newton MessagePad 110, Apple Computer, 408/996-1010, \$599.** This is the personal digital assistant that Apple should have shipped in August 1993,

with improved handwriting recognition, including deferred and letter-by-letter recognition. It also has more memory, longer battery life, and a more efficient design. Aug 94

★★★★ **OrangePC Model 200 Series, Orange Micro, 714/779-2772, \$1139 to \$3237.** If your goal is to get a Mac that runs Windows as fast as a PC, you can't get there from here. If your goal is to get business-level performance for day-in, day-out use, these PC coprocessor cards are your best choice. Aug 94

★★★★ **PLI Infinity 270 Turbo, PLI, 510/657-2211, \$599.** This 270MB SyQuest drive is fast, reliable, and a very good product. The cost of the medium is competitive with that of optical drives. Sep 94

★★ **PowerBook 150, Apple Computer, 408/996-1010, \$1449.** Fast, lightweight portable is minimalist in the extreme, with no video-out, ADB, Ethernet, or microphone. Unfortunately, the price is less minimalist, and most budget-conscious shoppers would be better off buying a used or discontinued model. Dec 94

★★★★ **PowerBook 540c, Apple Computer, 408/996-1010, \$4839.** The prestige PowerBook du jour, this sleek, curvy and futuristic-looking notebook makes a good computer for both on-the-road and in-the-office use. Its nonstandard battery, memory, and Ethernet ports are not ideal features, however. Oct 94

★★★★ **PowerBook Duo 280c, Apple Computer, 408/996-1010, \$3759.** If you travel a lot, this notebook computer is hands down the best Mac to get. It offers close to the power of a Quadra 650 in a subnotebook. Oct 94

★★ **PowerBook Duo Dock II, Apple Computer, 408/996-1010, \$969.** Apple has added Ethernet to this full-featured docking station, but installing NuBus cards is still absurdly difficult. Oct 94

★★★★ **Power Macintosh 7100/66, Apple Computer, 408/996-1010, \$2899.** Midrange Power Mac makes an outstanding workstation whose power should last for several years. The price is nothing to take lightly, but this system delivers every dollar's worth. Aug 94

★★★★ **Power Macintosh 8100/110, Apple Computer, 408/996-1010, \$6379.** High-end users who have invested heavily in NuBus cards can protect their investment with this top-of-the-line Power Mac. Mar 95

★★★★ **Power Macintosh 8100/80, Apple Computer, 408/996-1010, \$4249.** While this system doesn't quite offer the excellent price/performance ratio of the other available Power Macs, you should consider it if you're a high-end user moving your work over to RISC-based computing. Aug 94

★★★ **Power Macintosh Upgrade Card, Apple Computer, 408/996-1010, \$699.** Current 33MHz 040 machines will get the best bang for the buck with this card, which is a less expensive upgrade path than a standard motherboard replacement. However, other Macs won't realize as much of a performance gain. Oct 94

★★★★ **Quadra 630, Apple Computer, 408/996-1010, \$1279.** Fast, inexpensive, expandable 33MHz 68040 machine may be the last 680X0-based desktop Macintosh, but it's one of the best entry-level Macs ever. Nov 94

★★ **RCD-1000, Pinnacle Micro, 714/727-3300, \$1995.** The software for this CD-Recordable drive is easy to use, but it's too unreliable to use as a day-to-day backup system. Jun 95

## VIDEO/DISPLAY

★★★★ **Apple Macintosh Display Card 24AC, Apple Computer, 408/996-1010, \$1579.** 24-bit accelerated graphics card offers a satisfactory price/perfor-

mance ratio, although it can't switch resolutions from the keyboard. Oct 94

★★★★ **Apple Multiple Scan 15 Display, Apple Computer, 408/996-1010, \$509.** The trid tube of this 15-inch monitor provides a sharp and accurate image, but reflects some glare. The built-in stereo speakers reproduce sound nicely. Feb 95

★★★ **Apple QuickTake 100 for Macintosh, Apple Computer, 408/996-1010, \$749.** For a medium-quality, digital color camera, this is the best deal around. But you may want to wait until some of the camera's problems, such as its fixed-focus lens, are ironed out. Jul 94

★★★★ **FlexCam, VideoLabs, 612/988-0055, \$595.** Small, unobtrusive desktop video camera has a flexible gooseneck for positioning. Use it for video capture or videoconferencing. Dec 94

★★★ **L-TV Portable, Focus Enhancements, 617/938-8088, \$229.99.** Sturdy, inexpensive, external TV-converter plugs into your Mac and converts video output to NTSC. Aug 94

★★★★ **L-TV Pro NuBus, Focus Enhancements, 617/938-8088, \$299.99.** NuBus card converts your Mac's RGB video signal to NTSC so you can use your Mac with a TV or VCR. It supports a wide range of Macs, but the image has some flicker and distortion. Aug 94

★★★★ **Multiscan 15sf, Sony Computer Peripheral Products, 408/432-0190, \$569.95.** Trinitron monitor has a flat screen that displays sharp, bright, and accurate images. With good antiglare coating and adjustable image tilt, it's worth looking at. Feb 95

★★★★ **MultiSync 3V Monitor, NEC Technologies, 708/860-9500, \$495.** With a bright display and great image quality, this monitor delivers a fine picture at a moderate price. Feb 95

★★★★ **Panelight ZX, Panelight Display Systems, 415/772-5800, \$3995 to \$4695.** LCD panel offers vivid images at a comparatively low price. It's a great choice for presenters. Mar 95

★★★ **The Presenter Plus Mac/PC, Consumer Technology Northwest, 503/643-1662, \$429.** Small, external TV-converter supports output to television from most Macs with built-in video. Aug 94

★★★ **QA-350 LCD, Sharp Electronics Corp., 800/237-4277, \$1995.** At less than half the cost of a typical active matrix LCD panel, this passive matrix projection panel offers an economical alternative. Jul 94

★★★ **QA-1500, Sharp Electronics Corporation, 201/529-8731, \$5795.** While this LCD panel's display is crisp and flicker-free, placing a presentation on its PC Card is cumbersome. Less expensive products are available. May 95

★★★★ **QuickCam, Connectix Corp., 415/571-5100, \$149.95.** For as little as \$99 (street price), this tiny, fun, easy-to-use, digital video camera lets users experiment with video input for making QuickTime movies or capturing still images. Mar 95

★★★★ **SpigotPower AV, Radius, 408/541-6100, \$999.** Make full-screen, 30-fps movies with this first-rate video-compression-and-decompression board and accompanying JPEG software. Jun 95

★★ **Tornado Graphics Card, Mirror Technologies, 612/832-5622, \$699.** Inexpensive 24-bit accelerated graphics card has zoom and pan options but is relatively slow. Oct 94

★★★★ **VideoDirector, 1.5, Gold Disk, 408/782-0200, \$199.95.** Low-end video-editing system lets you log, edit, and organize videotape footage, copying selections from a source deck to a record deck. A good choice for nonprofessionals. Jun 95



# Streetwise Shopper

## SPECIAL HARDWARE AND SOFTWARE BUYING OPPORTUNITIES

### Selected and edited by Charles Barrett

The following listings include both time-sensitive promotions and open-ended offers being sponsored by Macintosh vendors and their resellers. Each listing indicates which products have been awarded a star rating in *Macworld's Reviews* (products rated ★★ or lower are not eligible for inclusion), have been selected as an **Editors' Choice**, or have won a **World-Class** award. In some cases, the editorial evaluation quoted is for an earlier product version. The Ⓢ symbol indicates that the product is Power Mac related. Except where otherwise indicated, prices given are suggested retail prices.

When placing an order, please mention that you saw the offer in *Macworld*. Should any problems arise, contact the *Streetwise Shopper* editor by fax (415/442-0766), phone (415/978-3241), or mail (*Macworld*, 501 Second St., San Francisco, CA 94107).

Vendors and resellers desiring to have products and services included in this section are encouraged to contact the *Streetwise Shopper* editor with particulars.

### BUNDLES

Ⓢ **AddDepth 2 + Typefaces + Clip Art** Ray Dream is including 30 display typefaces from FontBank and 200 clip-art images from Ultimate Symbol's Design Elements collection with its \$99 (reduced from \$149) 3-D-effects software (Aug 93 ★★ for AddDepth 1.0.2). Current customers can upgrade to AddDepth 2 for \$39 until 8/31/95. Call 800/846-0111 for more information.

**Anubis Professional + CD AutoCache** CharisMac Engineering is offering a \$99.95 bundle consisting of its \$129.95 Anubis Professional SCSI-device formatter and driver utility and its \$79.95 CD AutoCache, which monitors how CD-ROM disc data is being used and automatically adjusts cache and page sizes accordingly. Call 800/487-4420 for more information and to order.

Ⓢ **Claridraw + ClarisImpact 1.0** A bundle consisting of Claris's \$399 draw program for free-form graphics (including over 2400 pieces of clip art) and its \$149 integrated charting and diagramming program (Jun 94 ★★★★★) is available for \$199 through corporate resellers and retail outlets, or directly from Claris. Current customers who purchased ClarisDraw prior to April 1995 can obtain ClarisImpact direct from Claris for \$49 (\$54 S&H charge only for purchases made after April 1). Call 800/325-2747 for more information. Offer expires 7/31/95.

**DrawingSlate II + Painter 3** CalComp is including Fractal Design's \$499 Painter image-creation program (Apr 95 ★★★★★) with the 6-by-9-inch (active area) \$395 version of its DrawingSlate II digitizing tablet (Jun 95 ★★★★★), which includes a cordless pressure-sensitive pen. Available from resellers, such as MacMall (800/222-2808) for \$490 (#68782). For additional resellers, call 800/932-1212.

**FlexScan Monitor + ScreenManager Pro + Uni-**

**versal Adapter + After Dark 3.0** Nanao USA is bundling its ScreenManager Pro display utility (with serial cable) for point-and-click control of monitor functions, and a universal Macintosh adapter, free of charge with any of seven FlexScan monitor models, which include Sonnetec's Colorific software for calibrating color with printers. A coupon good for one free (except \$5 S&H) copy of Berkeley Systems' \$49.99 After Dark screen saver is also included. Call 800/800-5202 for more information.

**JVC RomMaker + Director 4.0 + Macro-Model 1.5** Marcan, a CD-ROM reseller, is offering Macromedia's \$1195 multimedia and animation program (Sep 94 ★★★★★, 1994 World-Class) and \$895 three-dimensional modeler (May 94 ★★★★★) free of charge to customers who purchase either the \$5495 double-speed or \$7495 quad-speed JVC RomMaker—a CD-ROM recording system intended for text and graphics archiving, 16-bit audio, and multimedia applications. Buyers can substitute 30 blank CDs for the two multimedia authoring tools. Call 800/635-7477 for more information.

Ⓢ **Power 80, 100, or 110 + Quicken 5 + Claris-Works 3.0 + New Utilities 5.0 + Now Contact 3.0 + Now Up-to-Date 3.0 + Bitstream Fonts** Power Computing is including the following software free of charge with its Mac-clone desktop systems, priced from \$1995 to \$2899 depending on configuration, and with its tower systems: Intuit's \$49.95 Quicken personal-finance software (Feb 95 ★★★★★); Claris's \$129 integrated software package (Feb 95 ★★★★★, 1994 World-Class); Now Software's \$129.95 system utilities collection (Jan 95 ★★★★★, 1994 World-Class) and its \$99 personal information manager bundle (Apr 95 ★★★★★); and 300 Type 1 and TrueType fonts from Bitstream. Available directly from Power Computing only. Call 800/999-7279 (or E-mail [info@powercc.com](mailto:info@powercc.com)) to specify options and to order.

Ⓢ **QuickTake 150 Digital Camera + PhotoFlash 2.0** Apple Computer is including its \$129 PhotoFlash photo-enhancement and -cataloging program (Jul 95 ★★★★★) and QuickTake Image Access software with its \$739 QuickTake camera. The bundled software automates downloading and image enhancement, while providing extensive image-editing and -cataloging capabilities. Call the Apple Referral Center at 800/538-9696 for more information.

**Targa 2000 + Adobe Premiere 4.0** Truevision is including Adobe's \$795 video editor (Dec 94 ★★★★★, 1994 World-Class) plus a \$495 suite of transitions free of charge with its \$5495 Targa 2000 nonlinear digital-video system—a NuBus card for digitizing, compressing, editing, and playback that can drive an RGB display at 1152 by 870 pixels in 24-bit color and output to a separate NTSC monitor. In addition, registered users of Radius or SuperMac digital-video systems can receive a 35 percent discount on Targa 2000 by trading in their cards. Call 800/858-8783 for more information. Offer expires 6/30/95.

Ⓢ **Vision 3d 4.0 + Myst 1.0** Mac's Place at Egghead is offering a free copy of Brøderbund Software's \$59.95 Myst graphical adventure game (Mar 94 ★★★★★) to customers who purchase Strata's \$695 three-dimensional modeling, rendering, and animation package (Jul 95 ★★★★★) on CD-ROM, for \$419.95. Call Mac's Place at 800/905-0009 to order (#10242). Offer expires 6/30/95.

### UPGRADES/SIDEGRADES

Ⓢ **MapInfo for Power Macintosh** MapInfo is offering this \$299 upgrade to its \$1295 mapping program, which is functionally identical to MapInfo for Macintosh 3.0, to current MapInfo 2.X or 3.X owners, for \$99. Call 518/285-6000 for more information. Offer expires 6/30/95.

Ⓢ **MicroStation V5** Bentley Systems is offering this \$3950 professional 3-D CAD program for \$1500 to registered users of AutoCAD, VersaCAD, MacBravo, and Claris-CAD. Call 800/778-4274 for more information and to order.

### SPECIAL DISCOUNTS/OFFERS/RESOURCES

**Andyne Pablo** Andyne Computing is offering this \$695 database-query program, which provides multidimensional summary information for any client-server architecture, for \$395. Free demo disk available. Call 800/267-0665 to order. Offer expires 6/30/95.

**CaLANdar 3.0** Microsystems Software is offering its \$595 (10-user), \$995 (20-user), and \$1995 (50-user) cross-platform LAN site licenses for this appointment scheduler, for \$495, \$795, and \$1295, respectively. Multiuser mail-enabled versions are also available. Call 800/489-2001 for more information. Offer expires 6/30/95.

**MarcoPolo 3.0; VIP-C 1.5; VIP-BASIC 1.5** Mainstay is offering its \$895 MarcoPolo document-imaging and -management software (Jan 95 ★★★★★) for \$595. Its \$495 VIP-C programming utility (Feb 95 ★★★★★) is available for \$295, and its \$295 VIP-BASIC programming language (Jun 94 ★★★★★ for version 1.0.1), for \$99. Call Mainstay at 800/484-9817 (code 4636) to order. Offer expires 7/31/95.

**OptiMem RAM Charger 2.0.1** Jump Development Group is offering this new \$129 version (Jul 95 ★★★★★) of its OptiMem memory-management utility for an introductory price of \$59.95. Call 800/586-7622 to order and to obtain a demo disk for \$4.95 S&H; or send E-mail to [jumpdev@netcom.com](mailto:jumpdev@netcom.com) with info request in the subject field to receive a free demo, which can be transformed into a permanent licensed and registered copy for \$49.95. Offer good through at least 6/30/95.

**URW DeSign Collection** URW America is offering this \$1399 collection of 870 PostScript Type 1 fonts, created for use at display sizes, for \$999. Call 800/229-8791 for more information and to order. Offer expires 8/31/95. **m**



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# Macworld

## Advertiser Index

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# Macworld

## Product Index

A quick and easy product index from Macworld. Simply use this index to find the page or advertiser of the products which interest you. Then, use the reader service number for our FastFacts Product Information Card located on the following page.

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- 01 ☐ 1000+  
02 ☐ 999 - 100  
03 ☐ 99 - 25  
04 ☐ Under 25
- B. Which of the following computers are installed at this entire work-site? (Check all that apply.)
- 05 ☐ Apple Workgroup Servers/Mac Quadra-series  
06 ☐ Mac Centris-series/II-series/LC III/Performa 600/450/SE 30  
07 ☐ Mac LC/LC II/Performa 430/405/400/200/Classic-series/SE/Plus/512K/128K/Portable  
08 ☐ Mac PowerBook-series/Duo-series
- C. What is the total number of Macs installed at this entire work-site? (Check one.)
- D. For how many Macintosh computers within this entire work-site do you have purchase involvement for products and/or services? (Check one.)
- |           |                             |                             |
|-----------|-----------------------------|-----------------------------|
|           | C                           | D                           |
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| 499 - 100 | <input type="checkbox"/> 10 | <input type="checkbox"/> 16 |
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| 9 - 1     | <input type="checkbox"/> 13 | <input type="checkbox"/> 19 |
| None      | <input type="checkbox"/> 14 | <input type="checkbox"/> 20 |
- E. In which ways are you ever involved in purchase decisions for Macintosh products at this entire work-site? (Check all that apply.)
- 21 ☐ Initiate/Determine need for product/capabilities/features  
22 ☐ Evaluate, recommend, or approve brands/models  
23 ☐ Evaluate, recommend, or approve purchase source  
24 ☐ Authorize purchases
- F. Over the next 12 months, how much will this entire work-site spend on Macintosh products and/or services? (Check one.)
- 25 ☐ \$1 million or more  
26 ☐ \$999,999 - \$500,000  
27 ☐ \$499,999 - \$100,000  
28 ☐ \$99,999 - \$50,000  
29 ☐ \$49,999 - \$10,000  
30 ☐ Under \$10,000
- G. Considering the entire work-site, which of the following Macintosh hardware and software products are currently installed? (Check all that apply.)
- 31 ☐ Business software (Word processing, spreadsheet, database, etc.)  
32 ☐ Graphics/publishing software  
33 ☐ Monitors/displays  
34 ☐ Printers/scanners  
35 ☐ Networking/communications hardware and/or software  
36 ☐ Multimedia/AV hardware and/or software  
37 ☐ Mobile computing products (PowerBooks, peripherals, software, etc.)
- H. What is your primary job function? (Check one.)
- 38 ☐ Computer Reseller/VAR/VAD  
39 ☐ MIS/DP/IS/Network Management  
40 ☐ Engineering  
41 ☐ R&D/Scientific  
42 ☐ Corporate/General Management  
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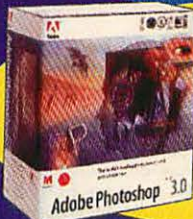


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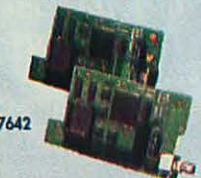
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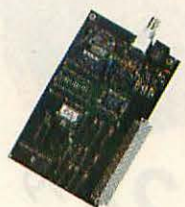
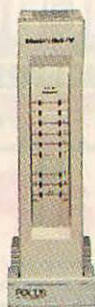


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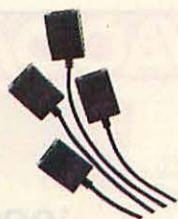


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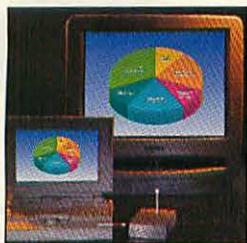
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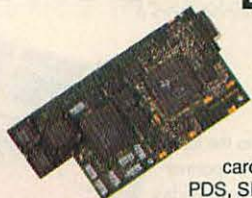
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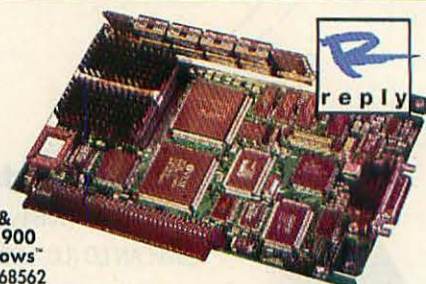
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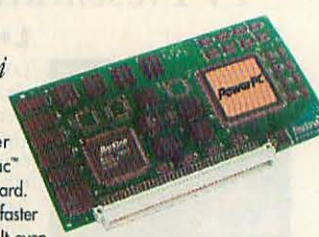


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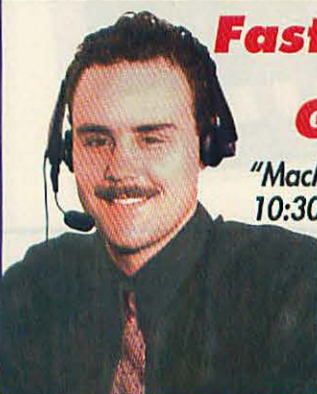
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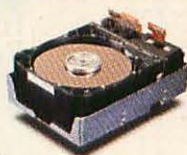
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### 5 YEAR WARRANTY

CAPACITY	SIZE	ACCESS	RPM	MODEL	EXTERNAL
1.2GIG	3.5"	9MS	5400	CFP1080S	\$ 515
2.1GIG	3.5"	9MS	5400	CFP2105S	\$ 915
2.1GIG	3.5"	8MS	7200	CFP2107S	\$ 1015
4.2GIG	3.5"	9MS	7200	CFP4207S	\$ 1475

### Quantum

### 5 YEAR WARRANTY

CAPACITY	SIZE	ACCESS	RPM	MODEL	EXTERNAL
2.1GIG	3.5"	9.5MS	7200	XP32150S LP	\$ 999
4.3GIG	3.5"	9MS	7200	XP34280S	\$ 1855

### HITACHI

CAPACITY	SIZE	ACCESS	RPM	INTERNAL	EXTERNAL
1.0	3.5"	9MS	6300	\$ 585	\$ 645

### POWERBOOK-CORNER

240MB	14MS internal	\$315
340MB	14MS internal	\$385
514MB	14MS internal	\$445
Datasonix Mobile Storage		\$649

### SyQuest

88MB	SQ5110C	\$365
200MB	SQ5200	\$485
270MB	SQ3270	\$485

### MONITORS

ys are both PC and Mac compatible		
ny GDM-15SF1 15"	\$435	
ny CPD-17SF1 17"	\$889	
ny GDM-20SE1 20"	\$1899	

### CD RECORDERS

Yamaha 4 speed recorder  
\$ 3395

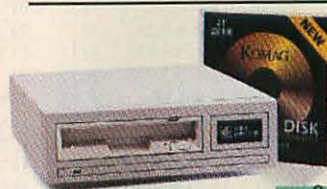


"We recommend the Yamaha CDE 100"  
-MacWorld Mar. '95

### SCANNERS

MUSTEK 1200dpi Color (2400 with interpolation)  
including transparency unit and software. Everything included for Mac, Dos, Windows \$889

MUSTEK 600dpi Color 8.5"x14" \$469



The new Sony 1.3GB half-height has 4MB of cache and 3600rpm making this the fastest Optical drive in the market today! Call for comparisons against the competition.

Sony's latest technology →

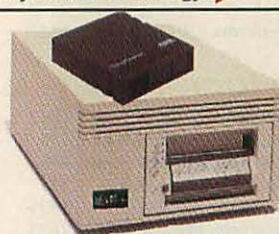
### OPTICAL DRIVES

230 MB EXTERNAL \$575

INCLUDES ONE CARTRIDGE

### 1 YEAR WARRANTY

CAPACITY	MODEL	EXTERNAL
230MB	Fujitsu	\$ 575
1.3GB	NEC	\$ 1599
1.3GB	Sony 4MB Cache	\$ 1949
1.3GB	Ricoh Turbo	\$ 2175
26GB	Sony Juxbox	\$ 6395



With 2.5mb/sec sustained transfer, the DLT2000 is perfect for digital video or pre-press with large data files.

### TAPE BACK-UP

### 2 Year Warranty

INCLUDES TAPE + RETROSPECT SOFTWARE

CAPACITY	MODEL	MEDIA	INTERNAL	EXTERNAL
1.3-2GIG	DC DAT	4MM	\$ 709	\$ 769
1.3-4GIG	DC DOUBLE DAT	4MM	\$ 839	\$ 899
4.0-8GIG	Connor 4326 DDS-2	4MM	\$ 1089	\$ 1149
4.0GIG	Sony 5200 DDS-2	4MM	\$ 939	\$ 999
4.0-8GIG	Sony 5000 DDS-2	4MM	\$ 969	\$ 1029
7.0-14GIG	Exabyte 8505XL	8MM	\$ 2185	\$ 2245
10-20GIG	Quantum DLT (DIGITAL LINEAR)	1/2	\$ 3575	\$ 3675
INCREDIBLE 2.5MB/SEC TRANSFER RATE				
-140GIG	Exabyte-10h Library	8MM		\$ 4999

Our Top rated RAID Systems include a Nubus accelerator card, Remus RAID software, and all cabling and termination.

### RAID SYSTEMS

FROM 1 TO 84 GIG



"Stick with a vendor such as Direct Connections that understands how to prepare a RAID for desktop video." MacWorld April '95

- 2.0GIG RAID Level 0. Perfect for highspeed requirements. \$ 2199
- This Array is the one to beat!! 4.0 GIG Barracuda 2 Wide RAID. \$ 3599
- 6.0 GIG Fast and Wide. Fastest RAID for Video Vision Users. \$ 4799

### VideoVision Studio \$ 3649

Full screen and full motion recording and playback with JPEG hardware compression and decompression.

radius

### MEDIA



128MB Optical	\$ 25	90M Tape	\$ 10
230MB Optical	\$ 29	112M Tape	\$ 15
650GIG Optical	\$ 79	120M Tape	\$ 18
1.3GIG Optical	\$ 99	CD ROM 10 Pack	\$ 99
SYQUEST 44MB	\$ 42	SYQUEST 88MB	\$ 48
SYQUEST 200MB	\$ 76	SYQUEST 270MB	\$ 61



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- Low fixed monthly payment
- Aggressive pricing

### Small Business Station



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**PowerMac 6100/66, 8-350 w/CD**  
15" Multiscan Display  
Extended Keyboard  
SyQuest 200, external

### CyberMac 81 Workstation

**PowerMac 8100/100AV, 16-1000 CD**  
20" Multiscan Display  
Thunder IV/GX 1152



Lease  
**\$310**  
36 mo

Extended Design Keyboard  
SyQuest 270, external

### The Enterprise 7101

**PowerMac 7100/80, 16-700 w/CD**  
17" Multiscan Display  
Ext. Design Keyboard  
SyQuest 270, external

Lease  
**\$179**  
36 mo

### Demon Workstation 8110



**PowerMac 8100/110, 16-2000 CD**  
21" Multiscan Display  
Thunder IV/GX 1600  
VideoVision 2 Pro Pak  
w/4.2 GB Array  
Premiere 4 & VideoFusion  
Ext KB, Apple Design Speakers

Lease  
**\$475**  
60 mo

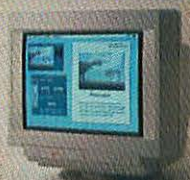
\* Activation required. Phones vary with rate plan. Phone certificates are transferred and valid for 6 mos. Allow 2-3 weeks for delivery. Certain restrictions may apply. Your store prohibited by law.

### PowerMac

	Lease	
6100/66, 8-350	1547	56
6100/66, 8-350 w/CD	1727	65
6100/66AV, 8-350 w/CD	2127	79
6100/66, 16-500 w/DOS	2477	89
7100/66, 8-500 w/CD	2197	82
7100/80, 8-500	2457	89
7100/80, 8-700 w/CD	2747	99
7100/80AV, 16-700 CD	3297	113
8100, 8-500	2695	94
8100, 16-500 w/CD	3195	109
8100/100, 8-700	3097	105
8100/100, 16-1GB w/CD	3877	131
8100/100AV, 16-1GB CD	4057	139
8100/110, 16-2GB w/CD	5397	185
WGServer6150, 16-700	2769	97
w/CD & Internet Svr for WWW		
WGServer8150, 16-1000	4577	159
w/CD, & Internet Svr for WWW		
WGServer95, 16-230	2949	106
Performa 6115CD	2277	86
Performa 630, 8-250 CD	1347	55

### Monitors

	Lease	
Apple 20" Multiple Scan	1849	67
Apple 17" Multiple Scan	889	32
Apple 15" Multiple Scan	449	14
Apple 14" Color Plus	295	--
Supermac 21" *TXL	1995	73
Supermac Pressview 21 T	2699	105
Radius IntelliColor/20e	1877	64
Radius PrecisionColor 17	939	36



Sony 20SE1 w/adaptor	1869	69
Sony 17SF1 w/adaptor	909	34
Sony 15" SF w/adaptor	477	19
Sony 1425S, 14" Trinitron	339	17

### Video Boards

	Lease	
Thunder IV/GX1600	2569	93
Thunder IV/GX1360	1999	73
Thunder IV/GX1152	1829	66
Radius P'Color Pro 24X	619	28
Radius P'Color 24XK	449	15
Radius P'Color 24XP	239	15
Radius Thunder 24GT	1269	48
Radius VIDEO VISION v2	3350	119
w/Premiere v4 & VideoFusion		
Supermac GX1600	1969	72
Supermac GX1360	1499	53

### Powerbooks

	Lease	
150, 4-120	997	47
520, 4-160	1559	57
520c, 4-160	1837	66
520c, 12-160 w/modem	2527	86
540c, 4-320	2787	105
540c, 12-500 w/modem	3697	127
280, 4-240	1950	70
280, 12-240 w/modem	2550	91
280c, 4-320	2987	106
280c, 12-320 w/modem	3499	124

### Printers

GCC WriteMove II 129 --  
\* (with any Powerbook purchase)  
360x360 dpi, Laser-quality, ATM  
included, on-screen page preview

Specials on all GCC Printers



	Lease	
GCC SelectPress 1200	4269	149
GCC Elite XL120B	4269	123
GCC Elite XL1616	2599	98
GCC ColorFast II	4099	117
(33-bit color digital film recorder)		
GCC Elite XL808	2729	99
GCC Elite XL608	2199	83
StyleWriter II	169	--
Color StyleWriter 2400	589	18
HP 4MV	2699	87
HP 5MP	1049	42
LaserWriter 16/600	1995	69
LaserWriter Select 360	1299	39

### Portable Color Printer \$199

### Scanners

	Lease	
Agfa StudioScan II	899	33
Agfa Arcus II w/transp.	2599	94
HP ScanJet IIIcx	939	34
UMAX Vista S6 Pro	739	28
UMAX Vista S8 Pro	869	31
UMAX 1260 Pro	919	35
UMAX Powerlook	2529	91
Microtek Scanmaker III	2675	88
Microtek IIHR	999	37

### CD-ROMs

<b>Arts</b>	
Macbeth	34.95
American Visions	59.95
Prince Interactive	39.95
The Orchestra	22.95
Freak Show	34.95
Rosetta Stone PowerPac	98.95
Salt of the Earth	34.95
A Hard Day's Night	19.95
Mozart	29.95
The Complete Maus	31.95

### Biz

PhoneDisc Powerfinder	139.95
Take Five	16.95
Great Business Jokes	9.95
AccuZip	499.95
Street Atlas USA	74.95

### Kids

Mario Is Missing!	39.95
Word Tales	9.95
Peter and the Wolf	19.95
DinoSource	29.95
Comic Book Confidential	34.95
Parenting	29.95

### Life

The Animals	22.95
The Rainforest	44.95
OceanLife Vol. 4: Great Barrier Reef	34.95
OceanLife Vol. 3: Hawaiian Islands	34.95
Audubon's Birds	29.95
Audubon's Mammals	29.95
Oceans Below	19.95
Whales & Dolphins	34.95

### Play (Games)

Myst	49.95
Cosmology of Kyoto	59.95
Star Trek 25th Anniversary	55.95
Baseball's Greatest Hits	34.95
Gadget	59.95
Indiana Jones—Fate of Atlantis	44.95
The Chessmaster 3000	29.95
The 7th Guest	45.95
The 11th Hour	65.95
C.H.A.O.S. Continuum	34.95
Funny	9.95

### Reference

Grolier's Encyclopedia v6.0	49.95
The View From Earth	19.95
Mayo Clinic—Family Health	39.95
Mayo Clinic—The Total Heart	39.95
Macintosh Product Registry	9.95
Exploring Ancient Cities	39.95
Compton's '95	55.95
World Atlas	22.95
US Atlas	22.95
Capital Hill	19.95
Space Shuttle	19.95
Desert Storm	22.95
The First Emperor of China	39.95
Who Built America?	34.95

### Drives

Pinnacle RCD 1000	1649
HHB 680 MB blank CDR	10.99
(Life Span: 100+ years)	
Pinnacle Tahoe 230	999
SyQuest 200c w/cart	577
Radius 4 GB Pro Array	5400
1 GB Conner1080	425
2.1 GB Quantum	899
2.4 GB Seagate Barracuda	1195
4 GB Seagate Barracuda4	1495
FWB HammerDAT2000	1297
FWB HammerDAT5000	1389

### Arrays from FWB

SledgeHammer4100 Wide	3729
SledgeHammer8200 Wide	5169
SledgeHammer17400 W	8399
SCSI JackHammer	599

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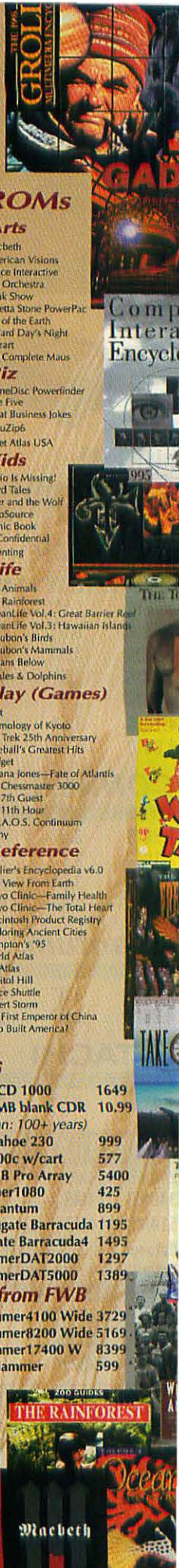
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- MacUser July, 1994

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- ✓ **Full 6-Year Warranty**
- ✓ **Immediate Availability**
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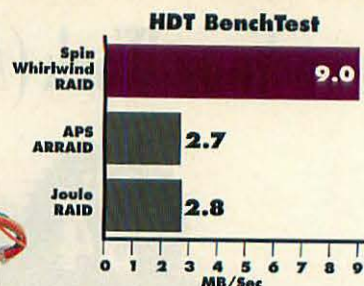
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Whirlwinds are the optimum video professional storage solution.

**Fast  
& Wide  
RAID!**



### Internal RAID

Our internal kit offers all of the advantages of RAID and can be conveniently mounted in the extra drive bay of your 800, 840AV, PowerMac 8100, or Workgroup Servers 80 and 8150. Dual fans keep the drives and your Mac cool. Internal arrays can be expanded with Whirlwind Fast & Wide drives through the Silicon Express IV external port.

CAPACITY	RAID 0,1	RAID 0,1,4,5
2GB	\$2999	\$3199
4GB	\$3799	\$3999



### SyQuest Drives

Spin SyQuest 3.5" and 5.25" removable drives accommodate your expanding storage needs without slowing you down. The new 200MB and 270MB continue the SyQuest reputation for convenience and reliability at higher speed and capacity. Small, lightweight cartridges are easy to transport and store.

SyQuest 44MB	Cartridge \$43
SyQuest 44/88MB	\$299 Cartridge \$48
SyQuest 200MB	\$409 Cartridge \$75
SyQuest 105MB	\$199 Cartridge \$56
SyQuest 270MB	\$429 Cartridge \$65



4 1/2 star rating  
for our SyQuest  
200 and 270!

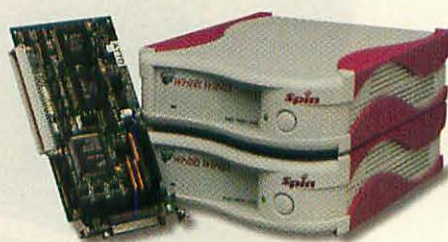
Retrospect backup  
software included.



### DAT Drives

Before disaster strikes, secure your valuable data with a Spin DAT drive. The low cost 3100 stores 2GB while the 3400 picks up to 8GB for remote backups and large audio, video and graphics files. All DAT drives include one tape cartridge and Retrospect® for easy, complete backups.

Spin 3100 (DDS)	\$799
Spin 3200 (DDS-DC)	\$899
Spin 3400 (DDS-2)	\$999



### Whirlwind RAID

Whirlwind RAID is fast enough to handle all types of applications, even high-quality 30 fps video. In benchmark tests, our Fast & Wide arrays approach transfer rates of 9 megabytes per second, and will deliver better than 5.5 MB/sec performance when used with Radius VideoVision Studio®. Package includes ATTO SE IV, Remus software RAID controller, active terminator.

CAPACITY	RAID 0,1	RAID 0,1,4,5
2GB	\$2999	\$3199
4GB	\$3799	\$3999
8GB	\$5399	\$5599



### QuickTape

Our new tape drive is the affordable backup storage solution. Easy to use and highly reliable, the Spin QuickTape will secure your valuable data faster than a 2GB DAT drive. Based on the new Tandberg mechanism, the drive can use 1GB QIC-Wide cartridges. Delivered with Cheyenne five-user backup software package and one cartridge.

QuickTape	\$499	Cartridge \$19
-----------	-------	----------------



### Optical Drives

Spin's 3.5" Olympus 230MB is the affordable solution to securing your data while the 5.25" Maxoptix 1.3GB optical drives set the standard for speed and capacity. Great for backups, archiving, and as a secondary drive. One cartridge included.

Olympus 230MB	\$599	Cartridge \$39
Maxoptix T4 1.3GB	\$1999	Cartridge \$85



**\$379!**  
Including Cartridge!

### Bernoulli Drives

Continuing the Bernoulli tradition of rugged dependability, the Spin 230MB cartridge drive provides unlimited capacity with additional cartridges. Featuring DCR Active Termination and a one year warranty, the 230MB drive is backwards compatible with older cartridges. One cartridge included.

Bernoulli 230MB	\$379	Cartridge \$89
3-Pack	\$199	

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for Macintosh  
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**230 Magneto-Optical**  
Featuring Cheyenne's ARCserve five-user backup software and two cartridges, the 3.5" Spin Olympus 230 Magneto-Optical is the premium solution for securing your data. Backup or archive your valuable Photoshop\*, Quark XPress\*, Excel\*, Word\* and database files for years.

Olympus 230 \$599 Cartridge \$39



Including the  
Anubis Formatting utility by  
CharisMac Engineering, Inc.



### Whirlwind

These Fast & Wide drives great for applications that require high speed storage, but not an array. Used with an ATTO Silicon Express IV, a Photoshop\* file rotates 65% faster than with a standard drive. The Whirlwind drives can also be added to our Fast & Wide arrays.

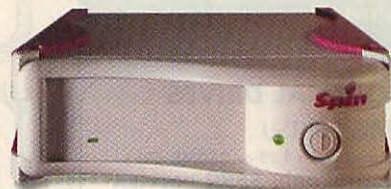
1GB Seagate Barracuda \$999  
2GB Seagate Barracuda \$1399  
4GB Quantum Atlas \$2199  
ATTO SE IV with drive purchase \$895



### PowerBook Drives

Spin 2.5" drives are fast, easy to install, and offer the capacity you need when you are on the road.

Quantum 170MB \$229  
Quantum 256MB \$249  
Quantum 341MB \$349  
Quantum 514MB \$449



### Hard Drives

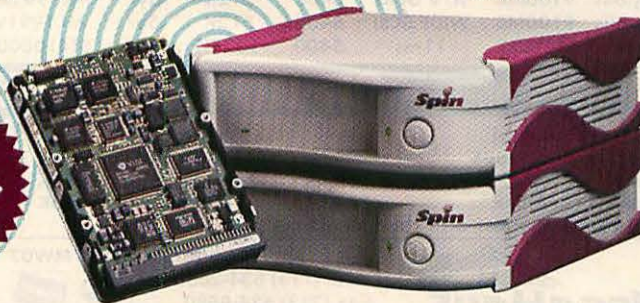
Our exclusive Tornado drives feature DCR Active Termination, a front mounted power switch, and interlocking feet for stable stacking. The easy-to-install Internal drives will have you up and ready in minutes.

CAPACITY	INTERNAL	TORNADO
Q Maverick 540MB	\$159	\$259
Q Empire 1.0GB	\$599	\$699
Q Capella 1.0GB	\$499	\$599
Spin 1.0GB	\$479	\$579

## High-Capacity, Low-Cost, Limited Time!

CAPACITY	INTERNAL	TORNADO
Seagate Hawk LP 2GB	\$849	\$949
Quantum Capella 2GB	\$849	\$949
Quantum Grand Prix 2GB	\$899	\$999
Quantum Grand Prix 4GB	\$1399	\$1499
Quantum Atlas 2GB	\$999	\$1099
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- DynaMO external \$649 1 free disk

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- Read and write 650MB or 1.3Gig disks
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- External only \$1599 1 free disk

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## MICROPOLIS

- NEW LOW PRICE on MicroDisk external stackable disk drives! Available now for only \$120 more than internal!
- WIDE SCSI A/V Drives now available.

## RAIDTEC DISK ARRAYS

- RaidTec SCSI to SCSI arrays are much faster than software driven RAID's! No CPU time is required to implement the RAID.
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- SAVE \$20 with hard drive sale! Alone \$499
- SiliconExpress II FAST SCSI \$499
- SiliconExpress IV WIDE SCSI \$859

## CD ROM RECORDER \$1799

- Smart and Friendly CD-R 1002
- Double Speed, Multi Session, 1MB buffer
- Includes Gear CD Authoring Software for Mac
- Media CDR63 or 74 Qty 50 \$8.50ea. Qty 100 \$8ea.

## 2.5" Powerbook Drives

Size	Speed	RPM	Brand	Price
240MB	14ms	4500	Fujitsu	\$245
256MB	17ms	4500	Quantum	\$255
514MB	17ms	4500	Quantum	\$425

## FUJITSU

**BEST BUY!**

FUJITSU OFFERS THE BEST VALUE ON THE MARKET!

- Low price guarantee on all Fujitsu drives!

Capacity	Speed	RPM	Buffer	Wty	Model	Internal	External
530MB	13.8ms	4500	256K	2yr	M2684S	\$209	\$269
1080MB	9.5ms	5400	256K	5yr	M1606S	\$489	\$549
2100MB	9.5MS	7200	512K	5yr	M2915S	\$899	\$959

## Quantum

### #1 HARD DRIVE FOR MAC!



Capacity	Speed	RPM	Buffer	Wty	Model	Internal	External
420MB	14ms	4500	128K	3yr	TB420S	\$Call	\$Call
541MB	11ms	4500	128K	2yr	LT540S	\$239	\$299
731MB	11ms	4500	128K	2yr	LT730S	\$265	\$325
850MB	14ms	4500	128K	3yr	TB850S	\$Call	\$Call
1080MB	12ms	5400	128K	3yr	FB1080S	\$529	\$589
1080MB	9.5ms	5400	512K	5yr	IMP1080S	\$559	\$619
2140MB	8ms	7200	1024K	5yr	XP32150	\$929	\$989
2160MB	9.5ms	5400	512K	5yr	EMP2160S	\$909	\$969
4280MB	8ms	7200	1024K	5yr	XP34300	\$1529	\$1589

MegaHaus is your #1 source for Quantum drives.

- Low price guarantee on all Quantum drives!
- Same day shipping on most orders!



## SyQuest

Genuine Syquest cartridges Qty 4-9 / 10+ or with drive.

44MB	\$42	\$40
88MB	\$47	\$45
105MB	\$53	\$50
200MB	\$76	\$71
270MB	\$59	\$56

Capacity	Speed	Compatible	Model	Buffer	Internal	External
88MB	20ms	44, 88MB	SQ5110C	32K	\$285	\$345
105MB	14.5ms	105MB	SQ3105S	64K	\$260	\$320
200MB	18ms	44,88,200MB	SQ5200C	64K	\$419	\$475
270MB	13.5ms	105, 270MB	SQ3270S	128K	\$409	\$465

MegaHaus is your #1 source for Syquest drives.

- Low price guarantee on all Syquest drives!
- 1 FREE cartridge with each drive!
- 2 year warranty on drive and case!
- 5 year warranty on all cartridges!
- Same day shipping on most orders!

Brand	Capacity	Speed	RPM	Buffer	Wty	Model	Internal	External
Seagate	1050MB	9ms	5411	512K	5yr	ST31230N	\$519	\$579
NEC	1083MB	11ms	4090	256K	3yr	D3827	\$399	\$459
Conner	1080MB	9ms	5400	256K	5yr	CFP1080S	\$479	\$539
Micropolis	2050MB	8.5ms	7200	512K	5yr	MC4221	\$949	\$1009
Micropolis	2050MB	A/V Gold	7200	512K	5yr	MC4221AV	\$999	\$1059
Micropolis	2050MB	WIDE SCSI	7200	512K	5yr	MC4221W	\$1059	\$1199
Conner	2147MB	9ms	5400	512K	5yr	CFP2105S	\$889	\$949
Conner	2147MB	9ms	7200	512K	5yr	CFP2107S	\$999	\$1059
Seagate	2147MB	9ms	5411	512K	5yr	ST32430N	\$889	\$949
Seagate	2147MB	8ms	7200	512K	5yr	ST32550N	\$989	\$1049
Seagate	2147MB	WIDE SCSI	7200	512K	5yr	ST32550W	\$1159	\$1299
Seagate	4290MB	9ms	5400	512K	5yr	ST15230N	\$1329	\$1389
Seagate	4290MB	8ms	7200	1024K	5yr	ST15150N	\$1500	\$1560
Seagate	4290MB	WIDE SCSI	7200	1024K	5yr	ST15150W	\$1659	\$1799
Micropolis	4294MB	8ms	7200	512K	5yr	MC3243	\$1329	\$1389
Micropolis	4294MB	A/V Gold	7200	512K	5yr	MC3243AV	\$1419	\$1479
Micropolis	4294MB	WIDE SCSI	7200	512K	5yr	MC3243W	\$1459	\$1599
Conner	4294MB	9.5ms	7200	512K	5yr	CFP4207S	\$1489	\$1549
Micropolis	9100MB	12ms	5400	512K	5yr	MC1991	\$2139	\$2239
Micropolis	9100MB	A/V Gold	5400	512K	5yr	MC1991AV	\$2249	\$2349
Micropolis	9100MB	WIDE SCSI	5400	512K	5yr	MC1991W	\$2299	\$2499
Seagate	9090MB	11ms	5400	1024K	5yr	ST410800N	\$3049	\$3149

## CD ROM DRIVES

Brand	Model	Speed	Transfer	Buffer	Internal	External
Sanyo	SH254S	190ms	600KB/sec	256K	\$229	\$279
Toshiba	XM3601	155ms	660KB/sec	256K	\$329	\$379
Plextor	6Plex	145ms	900KB/sec	256K	\$559	\$609

We also stock Pioneer disk changers, Sony, and NEC drives.



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## CD Rom Drives

NEC 2VMac	\$245
320ms access, 300Kb/sec transfer, 1 year warranty	
Chinon CDA525 Dual Speed	\$225
280ms access, 300Kb/sec transfer, 1 year warranty	
Chinon CDA535 Dual Speed	\$245
220ms access, 300Kb/sec transfer, 1 year warranty	
NEC 3Xp	\$395
240ms access, 500Kb/sec transfer, 1 year warranty	
NEC 4Xe	\$495
220ms access, 600Kb/sec transfer, 1 year warranty	
Plexor QuadSpeed	\$499
235ms access, 600Kb/sec transfer, 1 year warranty	
TOSHIBA QuadSpeed	\$299
120ms access, 600Kb/sec transfer, 1 year warranty	

## Digital Linear Tape Drives

### Quantum DLT

Model	Capacity	Trans.Rate	Media	Price(Ext)
DLT2000	20GB	2.5MB/sec	DLT20	2995.00
DLT4000	40GB	3MB/sec	DLT40	Call!

Ideal backup solution for network servers & highend workstations & systems!

## Quantum Quantum Quantum

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
LPS	170 MB	14 ms	3600	128K	2 Year	135	195
Mavenick	540 MB	14 ms	3600	128K	2 Year	215	275
LPS	340 MB	12 ms	4500	128K	2 Year	169	229
DSP3053	535 MB	9.5 ms	5400	512K	5 Year	225	285
Lightning	730 MB	11 ms	4500	128K	2 Year	255	315
Trailblazer	420 MB	11 ms	4500	128K	3 Year	Call	Call
Trailblazer	850 MB	11 ms	4500	128K	3 Year	Call	Call
Fireball	540 MB	10 ms	5400	128K	3 Year	Call	Call
Fireball	1080 MB	10 ms	5400	128K	3 Year	Call	Call
Grand Prix	2100 MB	9.5 ms	5400	512K	5 Year	915	975
Grand Prix	4200 MB	8.5 ms	7200	512K	5 Year	1395	1455
Atlas	1.0 GB	9 ms	7200	1024K	5 Year	Call	Call
Atlas	2.1 GB	9 ms	7200	1024K	5 Year	920	990
Atlas	4.3 GB	12 ms	7200	512K	5 Year	1535	1595

### Powerbook Drives

	Capacity	Size	Access	Cache	Warranty	Int.	Ext.
Daytona	256 MB	2.5"	17ms	128K	1 Year	240	340
Daytona	341 MB	2.5"	17ms	128K	1 Year	295	395
Daytona	514 MB	2.5"	14ms	128K	1 Year	415	515

## Genuine Products by



Capacity	Seek	RPM	Int.	Ext.
88 MB	SQ5110C 20ms	3200	300	360
200 MB	SQ5200 18 ms	3200	420	480
270 MB	SQ3270 13.5ms	3200	420	480

2 Year Warranty on all SyQuest Drives  
SyQuest drives come complete with a cartridge (Formatted or Unformatted) and the latest SCSI 4.3 compatible software.



Capacity	Model	Warranty	Price
44 MB	SQ400	5 year	\$41
88 MB	SQ800	5 year	47
105 MB	SQ310	5 year	53
200 MB	SQ2000	5 year	75
270 MB	SQ327	5 year	63

One FREE Cartridge Included with all SyQuest Drives!

## MICROPOLIS MICROPOLIS

### Price and Performance

## MICROPOLIS AV Drives-BEST for Music & Video

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
M4221	2.1 GB	8.5 ms	7200	512K	5 Year	935	995
M1936	3.6 GB	11 ms	5400	512K	5 Year	1225	1325
M43243	4.3 GB	8.5 ms	7200	512K	5 Year	1355	1415
M1991	9.0 GB	11 ms	5400	512K	5 Year	2170	2270
M4221W	2.1 GB	8.5 ms	7200	512K	5 Year	1035	1095
M43243W	4.3 GB	8.5 ms	7200	512K	5 Year	1455	1515
M1991W	9.0 GB	11 ms	5400	512K	5 Year	2270	2370

Micropolis  
M4221  
2.1 GB  
\$935.00

- Formatted Capacity
- 7200 RPM
- 512K cache
- 5 year warranty

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
M4221AV	2.1 GB	8.5 ms	7200	512K	5 Year	985	1045
M1936AV	3.6 GB	11 ms	5400	512K	5 Year	1275	1375
M43243AV	4.3 GB	8.5 ms	7200	512K	5 Year	1455	1515
M1991AV	9.0 GB	11 ms	5400	512K	5 Year	2315	2415
M4221WAV	2.1 GB	8.5 ms	7200	512K	5 Year	1085	1145
M43243WAV	4.3 GB	8.5 ms	7200	512K	5 Year	1525	1585
M1991WAV	9.0 GB	11 ms	5400	512K	5 Year	2395	2495



## Removable Drive Carriers

- Provides ability to easily remove and transport data.
- Ideal for disk array environments.
- Compatible with single ended, narrow differential, and fast and wide SCSI disk drives.
- SCSI ID select number is clearly displayed on front panel of the receiving frame.
- Key locked to prevent untimely or unauthorized removal of the drive carrier.
- 5 year warranty.

## Optical Drives

### Hewlett Packard, Fujitsu, & MaxOptics

Capacity	Model	Access	Int.	Ext.
1.3 GB	HP1716T	23.5ms	2235	2295
230 MB	M2512	30ms		585
1.3 GB	Tohiti III	18ms	2335	2395

## Scanners

Nikon Scantouch	\$1199
Transparency Adapter	\$499
Coolscan 35mm film scanner	\$1399
UC630/1260	675/1240
Vista-S6	760
Powerlook	3250

## Hard Drive Cabinets

Zero Footprint MicroCab	\$75
Full Height	\$89
Multi Bay Cabinets	\$139
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## MICROPOLIS 3.5" Stackable Disk Subsystems

### LT Super Capacity External Storage

M2100	2.1 GB	8.9 ms	7200	512K	5 Year	Call for the most
M4200	4.2 GB	8.9 ms	7200	512K	5 Year	competitive prices!

## SPRING SPECIALS

Quantum 170MB.....	Int. \$135 Ext. \$195
3600 RPM, 14 ms seek, 128K cache, 2 year warranty	
Quantum 340MB.....	Int. \$165 Ext. \$225
4500 RPM, 12 ms seek, 128K cache, 2 year warranty	
Quantum 535MB.....	Int. \$225 Ext. \$285
DSP 3053, 5400 RPM, 9.5 ms seek, 512K cache, 2 year warranty	
Quantum 730MB.....	Int. \$255 Ext. \$315
Lightning 730, 4500 RPM, 11 ms seek, 128K cache, 2 year warranty	
Conner 1.0 GB.....	Int. \$475 Ext. \$535
CFP1080, 5400 RPM, 9 ms seek, 5 year warranty	
Quantum Grand Prix2.0 GB.....	Int. \$895 Ext. \$955
O4200, 5400 RPM, 9 ms seek, 512K cache, 5 year warranty	
Micropolis 4.0GB.....	Int. \$1355 Ext. \$1415
M3243, 7200 RPM, 8.5 ms seek, 512K cache, 5 year warranty	

## Seagate Seagate Seagate Seagate Seagate

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
Hawk 2LP	1.2 GB	ST13200N 9.5ms	5400	512K	5 Year	\$535	\$595
Hawk 4	4.2 GB	ST15230N 9ms	5400	512K	5 Year	1325	1385
Barracuda	2.4 GB	ST3250N 8ms	7200	1024K	5 Year	1055	1115
Barracuda	4.2 GB	ST15150N 8ms	7200	1024K	5 Year	1475	1535
Barracuda	2.4 GB	ST32550W 8ms	7200	1024K	5 Year	1125	1195
Barracuda	4.2 GB	ST15150W 8ms	7200	1024K	5 Year	1575	1635
Eagle	9 GB	ST410800N 11ms	5400	512K	5 Year	2960	3060

## FUJITSU FUJITSU FUJITSU FUJITSU FUJITSU

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
M2684	530 MB	10ms	5400	512K	5 Year	220	280
M1606	1.0 GB	10ms	5400	512K	5 Year	525	585
M2915	2.1 GB	10ms	5400	512K	5 Year	945	995

## Tape Backup Drives

2.0 GB	\$835 \$885
HP35470, 15MB/min., 4mm media, 1 Year warranty	
3-5 GB	995 1055
HP35480, 45MB/min., 4mm media, 1 Year warranty	
4-10 GB	1225 1285
HP1533, 60MB/min., 4mm media, 1 Year warranty	
20-50 GB Auto Tape Loader	3195 3295
HP1553, 60MB/min., 4mm media, 1 Year warranty	
Exabyte	
2-5 GB	1425 1495
8205, 263KB/sec., 8mm media, 1 Year warranty	
7-14 GB	2250 2310
850EXL, 500KB/sec., 8mm media, 1 Year warranty	

All tape backup drives include 1 piece of media and Retrospect backup software.

DeskTape™  
Allows you to mount your DAT on the desktop. Backing up your data is as easy as drag and drop.

## Memory Products

Memory	Centris & Quadra
2x8x80	4MB 60/70ns
4x8x80 60/70ns	8MB 60/70ns
4x8x80FX	16MB 70ns
16x8x80LowProfile	32MB 60ns
16x8x80 FX	VRAM

Powerbook Memory	
520,520c,540,540c	
4MB,8MB,16MB,32MB	
140,170,160,165c,180,180c,Duos	
4MB,6MB,8MB,10MB	
12MB,14MB,20MB	

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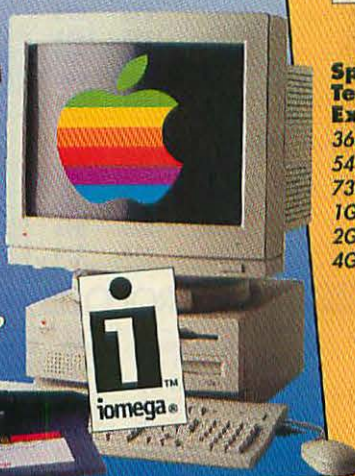
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- Portability and easy plug-and-play set-up • Comes with a SCSI cable and one 100MB removable disk

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(BER MAC100MBTEN) ... **\$149<sup>99</sup>**



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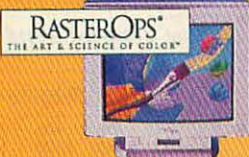


### Spirit Technologies External 4x CD-ROM Kit

- Quad-speed (150ms, 600KB/sec.) CD-ROM drive • Koss stereo speakers
- Headphones • Software includes Grolier's Multimedia Encyclopedia and Oceans Below • Two-year warranty

**\$399<sup>99</sup>** (SIT CDR-4BUNDLE)

**External Double-Speed CD-ROM Kit**  
(SIT CDR-BUNDLE) ... **\$229<sup>99</sup>**



### RasterOps ClearVue 20"

- 20" Sony Trinitron • 640x640 to 1280x1024 resolution
- Digital LCD controls • Anti-glare, anti-static Energy Star
- Supports built-in Macintosh video on Centris, Quadras and PowerMac

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**PaintBoard Prism-GT from RasterOps**  
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### SPIRIT TECHNOLOGIES

### Spirit Technologies External Hard Drives

- 365MB • 18ms... (SIT 365HDO1) **\$279<sup>99</sup>**
- 540MB • 18ms... (SIT 540HDO1) **\$329<sup>99</sup>**
- 730MB • 18ms... (SIT 730HDO1) **\$389<sup>99</sup>**
- 1GIG • 15ms... (SIT 1GBHDO1) **\$629<sup>99</sup>**
- 2GIG • 14ms... (SIT 2GBHDO1) **\$1229<sup>99</sup>**
- 4GIG • 17ms... (SIT 4GBHDO1) **\$1899<sup>99</sup>**



### MicroNet Advantage External 200MB SyQuest® Drive

- Provides the advantages of primary storage, archiving, file transport & backup • Includes one cartridge, SCSI system cable & software • 18ms access

**\$549<sup>99</sup>** (MNT ADV-SYQ200E)

**External 270MB SyQuest® Drive**  
(MNT ADV-SYQ270E) ... **\$549<sup>99</sup>**

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**\$129<sup>99</sup>** (GLV TELEPORTGD2)

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for PowerBooks 145, 160, 165, 180  
(GLV PWRPRTLTNM) ... **NEW \$339<sup>99</sup>**



### FastMac V.34 28.8 Data/Fax Modem

- 28,800bps data and 14,400bps fax transfer rate • Maximum throughput of up to 115,200bps with V.42bis/MNP 5 data transfer • Includes cables and software • Made in the USA

**\$139<sup>99</sup>** (FSM FMACV34)



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- 340MB • 13ms (MNT ADV-340MBE) **\$399<sup>99</sup>**
- 500MB • 14ms (MNT ADV-500MBE) **\$449<sup>99</sup>**
- 1GIG • 10ms (MNT ADV-1000E) **\$779<sup>99</sup>**
- 2GIG • 10ms (MNT ADV-2000E) **\$1299<sup>99</sup>**
- 4GIG • 10ms (MNT 4GIGEXT) ... **\$2699<sup>99</sup>**



### SyQuest® Cartridges

- 44MB Cartridge ... (SYQ 45MEGREMOV) **\$39<sup>99</sup>**
- 88MB Cartridge ... (SYQ 88REMOV) **\$44<sup>99</sup>**
- 105MB Cartridge ... (SYQ 105REMOV) **\$54<sup>99</sup>**
- 200MB Cartridge ... (SYQ 200MEGREMOV) **\$74<sup>99</sup>**
- 270MB Cartridge ... (SYQ 270REMOV) **\$59<sup>99</sup>**



### Zoom V.34 EXT Macintosh 28,800bps Fax/Modem

- Internationally approved V.34 standard for 28,000bps uncompressed data transmission plus V.Fast Class compatibility • Includes Microphone LT & FAXst

**\$179<sup>99</sup>** (ZOP V34XMAC)

### SupraExpress™ 144 Plus FAXModem

- 14,400 bps fax/data speed • LED display • modem status • Includes FAXcilitate™, MicroPhone™ LT & cables • 5-year limited warranty

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**External 28.8bps Data/Fax Modem**  
(SRA 50-V34E-MC) ... **\$219<sup>99</sup>**

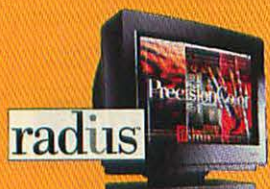
**Internal 28.8bps Fax/Modem for PowerBooks**  
(SRA 50-28FE-PB) ... **\$299<sup>99</sup>**



### Media Vision Reno Portable CD-ROM

- Double speed CD-ROM • SCSI 2 • 180ms access time • Works with AC adapter or battery • Includes headphones, carrying case, AC adapter & cables

**\$269<sup>99</sup>**  
(MDV MV450-RENO)



### Radius PrecisionColor 17"

- Sony Trinitron .26mm dot pitch • Supports built-in Macintosh video
- Meets Swedish MPR II guidelines • 1360x1024 with Radius card • 1 year Worry Free Radius Warranty

**\$979<sup>99</sup>** (RAD PRECOLOR17)

**SuperMac Thunder 24-GT Video Card**  
(SPM THUND24-GT) ... **\$1399<sup>99</sup>**

**SuperMac Thunder IV GX-1152**  
(SPM THUND4-1152) ... **\$1995<sup>99</sup>**

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LaserJet 5MP • 3MB, 600dpi, 4ppm  
(HP C3155A) ... **\$1099<sup>99</sup>**

**Hewlett-Packard LaserJet 4ML Printer**  
• Now powerful PostScript printing is within reach • 4MB memory • Lightning fast Intel 80960 18.5MHz RISC processor • Auto switching between Adobe PostScript Level 2 & enhanced HP PCL5 • 80 scalable fonts • 300 dpi • Super compact

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**Wacom ArtZ 6"x8" Graphics Tablet**  
• Graphics Tablet with UltraPen™ lets you create art, personalize documents & more • Small & lightweight - it allows you to draw, illustrate & paint

**\$299<sup>99</sup>**

(WAC UD0608A)

12"x12" Tablet (WAC UD12X12) ... **\$529<sup>99</sup>**

ArtPad (WAC ARTPAD-MAC) ... **\$149<sup>99</sup>**

**Hewlett-Packard ScanJet IIIc Color Scanner**  
• Ideal for both mono-chrome & color graphics & text • High quality 600 dpi resolution • Fast 1-pass image scanning • Includes Photoshop LE, OCR software and cables

**\$979<sup>99</sup>**

(HP C2529A)

ScanJet IIIp • Grayscale, 300dpi  
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**UMAX BizCard Reader**  
• Read, store & manage your business card collection • Plug & play - plugs into parallel port • Background processing • Real time/deferred processing • Includes database manager

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(UMX BCMAC)

Vista-T630 • 600x300dpi, 24-bit  
(UMX SOHOMAC) ... **\$499<sup>99</sup>**

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• The only trackball with fully integrated hardware & software • Space saving design with comfortable large-diameter ball, easy-click buttons, ultra-smooth long-lasting bearings & 2 ADB ports • Includes custom software

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Thinking Mouse (KEG 64101) ... **\$89<sup>99</sup>**

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1MB Simms (PNY 4MEG05) ...	<b>\$169<sup>99</sup></b>
3MB Simms (PNY 8MEG05) ...	<b>\$339<sup>99</sup></b>
6MB Simms (PNY 16MEG01) ...	<b>\$499<sup>99</sup></b>

**PNY Memory Simms For PowerBooks 500 Series**

4MB Simms (PNY PM1912LLA) ...	<b>\$229<sup>99</sup></b>
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16MB Simms (PNY PM1914LLA) ...	<b>\$699<sup>99</sup></b>

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**Broderbund Myst**  
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**PROPHONE**  
**ProPhone Select Phone '95**  
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**SYMANTEC**  
**Symantec Norton Utilities 3.1**  
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**Bob Dylan Highway 61**  
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System 7.5 ... (APP 2920LL) ...	\$89.95
Berlitz Think & Talk French • CD-ROM ... (HYM FRENCH-C) ...	\$99.95
Works • Mac/PowerMac ... (CLM WORKS) ...	\$129.95
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To Meet Your Storage Needs

### MICROPOLIS

5 YEAR WARRANTY

Capacity	Model #	Seek	RPM	Internal	External
2.4 GB (3.5")	DT-4221 LOW PROFILE	8 MS	7200	\$999	\$1064
3.6 GB (5.25")	DT-1936	11 MS	5400	\$1299	\$1399
4.0 GB (3.5")	DT-3243	8.5 MS	7200	\$1399	\$1465
9.0 GB (5.25")	DT-1991	11 MS	5400	\$2345	\$2499

### MICROPOLIS AUDIO/VIDEO SERIES

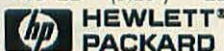
Capacity	Model #	Seek	RPM	Internal	External
2.4 GB (3.5")	DT-4221AV/LOW PROFILE	8 MS	7200	\$1050	\$1114
3.6 GB (5.25")	DT-1936AV	11 MS	5400	\$1399	\$1499
4.0 GB (3.5")	DT-3243AV	8.5 MS	7200	\$1450	\$1515
9.0 GB (5.25")	DT-1991AV	11 MS	5400	\$2445	\$2599



NEW LOW PRICING!!!

5 YEAR WARRANTY

Capacity	Model #	Seek	RPM	Internal	External
1.2 GB (3.5")	DT-31200	10 MS	5400	\$565	\$630
2.4 GB (3.5")	DT-12400	9 MS	5400	\$1050	\$1125
2.4 GB (3.5")	BARRACUDA 2 LP	8 MS	7200	\$1075	\$1140
2.4 GB (3.5")	BARRACUDA 2 WIDE	8 MS	7200	\$1199	\$1299
4.2 GB (3.5")	BARRACUDA 4	8 MS	7200	\$1499	\$1565
4.2 GB (3.5")	BARRACUDA 4 WIDE	8 MS	7200	\$1599	\$1799
3.5 GB (5.25")	ELITE 3	10 MS	5400	\$1979	\$2079
9.0 GB (5.25")	ELITE 9	11 MS	5400	\$3095	\$3195



5 YEAR WARRANTY

Capacity	Model #	Seek	RPM	Internal	External
1.2 GB (3.5")	DT-C3323	10 MS	5400	\$750	\$810
2.4 GB (3.5")	DT-C2490	8.5 MS	6400	\$1199	\$1299

### Quantum

2 YEAR WARRANTY

Capacity	Model #	Seek	RPM	Internal	External
365 MB (3.5")	L7G365	10 MS	4500	\$195	\$265
540 MB (3.5")	LPS540	10 MS	4500	\$240	\$299
730 MB (3.5")	LPS730	11 MS	4500	\$289	\$350
1.0 GB (3.5")	EM1080	9.5 MS	5400	\$605	\$665
1.4 GB (3.5")	EM1400	9.5 MS	5400	\$775	\$835
2.1 GB (3.5")	EM2100	9.5 MS	5400	\$999	\$1065



IBM QUALITY!

5 YEAR WARRANTY

Capacity	Model #	Seek	RPM	Internal	External
1.2 GB (3.5")	IBM0662	8 MS	5400	\$620	\$680
2.35GB (3.5")	IBM0664	9 MS	5400	\$1075	\$1175
4.0 GB (3.5")	IBM34320	8 MS	7200	\$2200	\$2300

All Drives are preformatted, tested and packaged with SCSI Manager 4.3 compatible drivers.

External configuration includes choice of 25-50 or 50-50 pin double shielded, twisted pair cable.

Ask your Sales representative about ACTIVE TERMINATION.



SyQuest REMOVABLE

Capacity	Model #	Internal	External
44/88MB	SQ5110C	\$305	\$365
105 MB	SQ3105	\$245	\$305
200 MB	SQ5200	\$425	\$485
270 MB	SQ3270	\$425	\$485

SYQUEST Drives include ANUBIS formatting software and 1 free cartridge

### SYQUEST MEDIA NEW LOW PRICING!!

44 MB	\$42	105 MB	\$54
88 MB	\$48	200 MB	\$76
		270 MB	\$64

### CD ROM DRIVES

Make	Model #	Seek	External
Toshiba CD ROM	DT-4101	320MS	\$275
Toshiba CD ROM	DT-3401E	200MS	\$395
Toshiba CD ROM	DT-3501E 4x	120MS	\$430

### MAKE YOUR OWN CD!!!

JVC Personal Archiver \$1999

### TAPE BACKUP

Capacity	Model #	Format	External
4.0GB	SONY 5200	DDS-2	\$1080
4-8GB	SONY 5000	DDS-2	\$1199
4-8GB	HP 1533A	DDS-2	\$1375
2-5GB	EXABYTE 8205	8MM	\$1499
5-10GB	EXABYTE 8505	8MM	\$2275

### OPTICAL

Capacity	Model #	Seek	External
230MB	FUJITSU 230OP	28MS	\$825
1.3GB	HP C1716	23MS	\$2299
1.3GB	MAXOPTIX TAHITI III	18MS	\$2399

### MEDIA

1 GB	\$100	128 MB	\$30
1.3 GB	\$89	230 MB	\$39

### DISK ARRAYS

Capacity	Model #	Seek Time	Trans. Rate	Price
2.0GB	DT-31200AR	9MS	7MB per sec.	\$CALL
4.0GB	DT-32550AR	4.5MS	8MB per sec.	\$CALL

Disk Arrays include Trillium Research Software and ATTO SCSI Accelerator Board. Great for Radius VIDEO VISION!!!

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#94099 Performantz Mini 2X CD-ROM Drive \$178.98

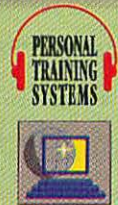
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MW507







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88MB Cartridges (10+ or with drive purchase)	\$38 / 45
44MB Cartridges (10+ or with drive purchase)	\$33 / 39

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**OPTICAL CARTRIDGES**

3.5" OPTICAL	PRICE
Sony 128MB	\$29
dsc 128MB	\$17
dsc 230MB	\$32
Komag 128MB	\$24
Komag 230	\$28
Sony 230	\$39

**SALE**

**5.25" OPTICAL**

PRICE	
Sony 650MB	\$75
3m 650MB	\$75
dsc 650MB	\$64
Komag 650	\$69
Tahiti II 1GB	\$159
Komag 1.0GB	\$81
dsc 1.3GB	\$79
Komag 1.3GB	\$83
Sony 1.3GB	\$95

**SALE**

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CARTRIDGES	PRICE
Sony DAT 90m	\$12
Sony DAT 120m	\$21
Maxell 8mm 112m	\$24
Sony 6250	\$25
Sony 6525	\$29

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**SyQUEST 270MB \$435!**

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- Meets the speed and capacity requirements of image processing and publishing professionals

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- 16GB per 120 meter tape
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MODEL	CAPACITY	SIZE	MacKit	dsc
Sony SDT-2000	2GB	3.5"HH	\$725	\$775
Sony SDT-4000	8GB	3.5"HH	\$935	\$985
Sony SDT-5000	5-16GB	3.5"HH	\$969	\$1019
Exabyte 8200	2GB	5.25"FH	\$1275	\$1350
Exabyte 8500	5GB	5.25"FH	\$2175	\$2250
Exabyte 8205	2-5GB	5.25"HH	\$1479	\$1529
Exabyte 8505XL	5-10GB	5.25"HH	\$2189	\$2239

**SALE**

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo model includes Retrospect and 72-hour warranty repair.

**OPTICAL DRIVES**

- High 2.0MB p/s transfer rate
- Economical storage of large color images and digital audio/video data
- Durable cartridges keep data safe for up to 30 years!

**SALE**

**5.25" DRIVES**

CAPACITY	SEEK	MacKit	dsc
Sony 650	650MB	19ms	\$999
Sony 1.3GB	1.3GB	25ms	\$1699
MaxOptix-Tahiti II	1.0GB	25ms	\$1299
MaxOptix-Tahiti III	1.3GB	25ms	\$1989
PMO-1.3GB	1.3GB	19ms	\$2379

**SALE**

**OLYMPUS 128MB \$389!**

- Convenient 3.5" format
- Optical technology for years of reliable storage

**SALE**

**3.5" DRIVES**

CAPACITY	SEEK	MacKit	dsc
Olympus 128	128MB	35ms	\$389
Fujitsu-230	230MB	30ms	\$639
Most-256	256mb	37ms	\$895

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Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo model includes FWB Hard Disk Toolkit and 72-hour warranty repair.

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- Compatible with all magneto optical drives
- Made in the USA
- Every cartridge fully tested and certified
- LIFETIME Warranty

**SYQUEST DRIVES**

**Turbo-charged SyQuest Drives!**

MODEL	INTERNAL	EXTERNAL	dsc
SyQuest 270	\$370	\$410	\$435
SyQuest 200	\$355	\$395	\$420
SyQuest 105	\$190	\$230	\$255
SyQuest 88C	\$260	\$300	\$325
SyQuest 44	\$130	\$160	\$185

**SALE**

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo model includes FWB Hard Disk Toolkit and 72-hour warranty repair.

**MULTIFUNCTIONAL DRIVES**

- Up to 6 devices in the same enclosure!
- Costs less than individual drives
- Quick setup. Only one cable!
- Promotes data security. Just lock it away after hours.

**SALE**

**SYQUEST 200 /540MB HD COMBO \$669!**

MULTIFUNCTIONAL	PRICE
SyQuest 200 /540MB hard drive	\$669
Sony SDT 5000 /2.0GB Quantum	\$1899
Sony 650MB Optical /SyQuest 200	\$1199
Olympus 3.5" optical /Nikon Coolscan	\$1899
SyQuest 88C /650MB optical drive	\$1099
SyQuest 88C /NEC 3X CD ROM /540MB HD	\$979
128MB optical drive /540MB hard	\$699
NEC 3X CD-ROM /1.3GB optical drive	\$1999
4.0GB Seagate HD /Nikon CoolScan	\$2999

**SALE**

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**CD-ROM DRIVES**

- Quad speed
- Supports PhotoCD, Multisession and MPC
- Includes FWB CD Toolkit FREE!

**SALE**

**TOSHIBA 3501 \$425!**

MODEL	PRICE
Toshiba 3501 QuadSpeed	\$425
NEC MultiSpin 2V	\$189
NEC MultiSpin 4X1	\$369
NEC MultiSpin 4Xe	\$459
CD-ROM Special (with CD-ROM drive purchase)	\$79

**SALE**

**CD ROM RECORDERS**

MODEL	PRICE
PinnacleMicro CDR-1000	\$1799
Yamaha 4-Speed CD-ROM Recorder	\$3369

**SALE**

**HARD DRIVES**

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**dsc FWB Hard Disk Toolkit. \$59 Value!**

**Turbo Drives**

Now even faster! Turbo models have guaranteed 72-hour replacement plus FWB Hard Disk Toolkit—FREE!

**TURBO QUANTUM 2.1GB \$974!**

**Quantum**

QUANTUM WARRANTY: 2 TO 5 YEARS

MODEL	ACCESS	INTERNAL	EXTERNAL	dsc
85MB Go	Daytona	17ms	\$199	\$319
256MB Go	Daytona	17ms	\$239	\$359
341MB Go	Daytona	17ms	\$289	\$409
512MB Go	Daytona	17ms	\$389	\$509
42MB	Maverick	17ms	\$79	\$139
85MB	Maverick	17ms	\$110	\$170
270MB	Maverick	14ms	\$150	\$210
365MB	Lightning	11ms	\$175	\$235
540MB	Maverick	14ms	\$215	\$275
540MB	Lightning	11ms	\$225	\$285
730MB	Lightning	11ms	\$255	\$315
1.0GB	Empire	9.5ms	\$509	\$569
1.4GB	Empire	9.5ms	\$659	\$719
2.1GB	Atlas	9.5ms	\$889	\$949
4.2GB	Atlas	9.5ms	\$1489	\$1549

**SALE**

**Seagate**

SEAGATE WARRANTY: 5 YEARS

MODEL	ACCESS	INTERNAL	EXTERNAL	dsc
1.0GB	Hawk 1	9ms	\$519	\$579
2.1GB	Hawk 2LP	9ms	\$949	\$1009
2.1GB	Barracuda 2LP	8ms	\$1049	\$1109
2.1GB	Barracuda 2W*	8ms	\$1129	\$1189
4.3GB	Hawk 4LP	9ms	\$1329	\$1389
4.3GB	Barracuda 4LP	8ms	\$1479	\$1539
4.3GB	Barracuda 4W*	8ms	\$1579	\$1639
3.4GB	Elite 3	10ms	\$1935	\$2035
9.1GB	Elite 9	11ms	\$2989	\$3089

**SALE**

**IBM**

IBM WARRANTY: 5 YEARS

ACCESS	INTERNAL	EXTERNAL	dsc
160MB	12ms	\$140	\$200
364MB	12ms	\$169	\$229
540MB	12ms	\$199	\$259
720MB	11ms	\$229	\$289
1.0 GB	11ms	\$499	\$559
2.0 GB	11ms	N/A	\$799

**SALE**

**FUJITSU**

FUJITSU WARRANTY: 5 YEARS

ACCESS	INTERNAL	EXTERNAL	dsc
540MB	9ms	\$209	\$269
1.2GB	9ms	\$519	\$579
2.1GB	9ms	\$939	\$999

**SALE**

For Active Termination, add \$29. Additional 50/50 SCSI cables, \$15 each.

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo models include FWB Hard Disk Toolkit and 72-hour warranty repair.

\* Fast/Wide drives require ATTO SE IV SCSI interface card at \$895

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- Supports Raid Levels 0 and 1 for disk mirroring and striping
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MODEL	DESCRIPTION	ARRAY	VIDEOVISION
dsc 2.0GB Array	(2 x 1.0GB drives)	\$1319	N/A
dsc 4.0GB Array	(2 x 2.0GB drives)	\$2569	\$2899
dsc 8.0GB Array	(2 x 4.0GB drives)	\$2999	\$3699
dsc CD-ROM Array	(2 x Toshiba 3501)	\$999	N/A

**SALE**

Includes external disk array, SCSI Cable, MAC SW and terminator.

\*VideoVision Studio support requires ATTO Fast/Wide interface; add \$895

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- ★ Best Storage
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### Macworld 1993 World-Class Award:

- ★ Best Storage

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- ★ Best Technical Support

### MacUser Editor's Choice Award 1993:

- ★ Best New Storage Product



**APS Q 730**  
**\$259<sup>95</sup>**

Internal configuration



**APS Q 365**  
**\$179<sup>95</sup>**

Internal configuration

## APS Q 365 / Q 730

- ✓ Today's best value for data intensive storage needs
- ✓ Formatted capacity up to 700MB
- ✓ 2-year warranty for high product reliability

**APS MS 9.0**  
**\$2299<sup>95</sup>**

Internal configuration



## APS MS 9.0

- ✓ Transfer rates as high as 3.69MB per minute gives you the performance you need
- ✓ 5-year warranty ensures product reliability
- ✓ Formatted capacity up to 8.6GB

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## APS SCSI HARD DRIVES

Model	Capacity	Internal	SR2000
<b>349-2047MB</b>			
APS Q 365 <sup>2</sup>	349MB	\$179 <sup>95</sup>	\$279 <sup>95</sup>
<small>Quantum 365 Lightning</small>			
APS Q 730 <sup>2</sup>	699MB	259 <sup>95</sup>	359 <sup>95</sup>
<small>Quantum 730 Lightning</small>			
APS ST 1.0 <sup>5</sup>	1010MB	549 <sup>95</sup>	649 <sup>95</sup>
<small>Seagate ST 31230N Hawk</small>			
APS Q 1.0 <sup>5</sup>	1025MB	699 <sup>95</sup>	799 <sup>95</sup>
<small>Quantum Atlas XP31070</small>			
APS Q 2.0 <sup>5</sup>	2050MB	999 <sup>95</sup>	1099 <sup>95</sup>
<small>Quantum Atlas XP32150</small>			
APS MS 2.0 <sup>5</sup>	1955MB	999 <sup>95</sup>	1099 <sup>95</sup>
<small>Micropolis 4221</small>			
APS MS 2.0av <sup>5</sup>	1955MB	1099 <sup>95</sup>	1199 <sup>95</sup>
<small>Micropolis 4221AV</small>			
APS ST 2.0 <sup>5</sup>	2047MB	1099 <sup>95</sup>	1199 <sup>95</sup>
<small>Seagate ST 32550N Barracuda</small>			

DATA™ patent pending  
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Internal drives for Quantum 800 and Centris 610 available  
1-5 Devices length of manufacturer's warranty in years  
Full Height cases include SCSI Sentry FREE!

Model	Capacity	Internal	SR2000
<b>4064-8669MB</b>			
APS MS 4.0 <sup>5</sup>	4064MB	\$1399 <sup>95</sup>	\$1499 <sup>95</sup>
<small>Micropolis 3243</small>			
APS MS 4.0av <sup>5</sup>	4064MB	1499 <sup>95</sup>	1599 <sup>95</sup>
<small>Micropolis 3243AV</small>			
APS Q 4.0 <sup>5</sup>	4101MB	1499 <sup>95</sup>	1599 <sup>95</sup>
<small>Quantum Atlas XP34300</small>			
APS ST 4.0 <sup>5</sup>	4094MB	1599 <sup>95</sup>	1699 <sup>95</sup>
<small>Seagate ST 15150N</small>			
APS MS 9.0 <sup>5</sup>	8669MB	2299 <sup>95</sup>	2499 <sup>95</sup>
<small>Micropolis 1991</small>			
APS MS 9.0av <sup>5</sup>	8669MB	2399 <sup>95</sup>	2599 <sup>95</sup>
<small>Micropolis 1991AV</small>			
APS ST 9.0 <sup>5</sup>	8669MB	3299 <sup>95</sup>	3499 <sup>95</sup>
<small>Seagate ST410800N</small>			

External case is special Full Height only



Model	Capacity	RAID LEVEL	Price
<b>APS DISK ARRAYS (0-1)</b>			
ARRAID S2/5400 <sup>5</sup>	2GB	Striped (0)	\$1399 <sup>95</sup>
ARRAID S2/7200 <sup>5</sup>	2GB	Striped (0)	1599 <sup>95</sup>
ARRAID S4/7200 <sup>5</sup>	4GB	Striped (0)	2499 <sup>95</sup>
ARRAID S8/7200 <sup>5</sup>	8GB	Striped (0)	3299 <sup>95</sup>
ARRAID M1/7200 <sup>5</sup>	1GB	Mirrored (1)	1599 <sup>95</sup>
ARRAID M2/7200 <sup>5</sup>	2GB	Mirrored (1)	2499 <sup>95</sup>



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APS Technologies

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- ✓ Transfer rates to 30MB per minute
- ✓ Includes Retrospect v2.1 software by Dantz **FREE!**



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(Sony 3080XLF)

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24 Hours a day  
7 Days a week



## APS TAPE DRIVES

Model	Capacity*	Internal	External
APS HyperTape <sup>1</sup>	4GB†	—	\$499 <sup>95</sup>
APS DAT <sup>2</sup>	4GB	\$749 <sup>95</sup>	799 <sup>95</sup>
APS HyperDAT <sup>1</sup>	8GB	949 <sup>95</sup>	999 <sup>95</sup>
APSDLT20 <sup>2</sup>	20GB†	—	3999 <sup>95</sup>

\*Actual data compression and tape capacity vary greatly depending on the type of data recorded, other system parameters and environment.  
† 2:1 Software data compression. ‡ 2:1 Hardware data compression.

All APS DAT, DLT & HyperTape drives include Retrospect by Dantz

Tape Media	1-4	5-19	20+
3080XLF (HyperTape)	\$34.95	\$32.95	\$31.95
60-Meter	7.95	6.95	5.95
90-Meter	9.95	8.95	7.95
120-Meter (DDS-2)	19.95	18.95	17.95
DLT Data cartridge	45.95	—	—
DLT 3PK Data cartridges	129.95	—	—

## APS REMOVABLES

Model	Capacity	SR 2000
APS SQ 3270 <sup>2</sup>	255MB	\$479 <sup>95</sup>
APS SQ 5200 <sup>2</sup>	194MB†	499 <sup>95</sup>

† Does not format 44MB & 88MB cartridges  
All SyQuest drives include 1 FREE cartridge

SyQuest Media	1-4	5-9	10+
SQ-400 (44MB) cartridge	\$44.95	\$43.95	\$41.95
SQ-800 (88MB) cartridge	54.95	53.95	51.95
SQ-2000 (200MB) cartridge	84.95	83.95	81.95
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SQ-327 (270MB) cartridge	64.95	63.95	61.95

Prices listed are for unformatted media

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- Drive-for-Drive Repair or Replacement Warranty\* The warranty length is denoted by the superscripted number next to each drive model. APS will, at its discretion, replace or repair products found to be defective according to the terms of the product's warranty.
- All prices and specifications are subject to change without notice.
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- All external drive products and cases come with a premium 25 x 50 SCSI cable.
- International customers must pay for all shipping charges.
- Toll-free Technical Support as needed. Regular hours are 8 am to 8 pm Monday thru Friday, 9 am to 5 pm Saturday, Central Time.

## APS MO DRIVES

Model	SR 2000
APS 230MB MO <sup>1</sup>	\$599 <sup>95</sup>
APS 1.3GB MO <sup>1</sup>	1999 <sup>95</sup>

All MO drives include 1 FREE cartridge  
1-5 Denotes length of manufacturer's warranty in years

MO Media	1-4	5-9	10+
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APS Q 341 <sup>1</sup>	326MB	299 <sup>95</sup>
APS Q 514 <sup>1</sup>	491MB	399 <sup>95</sup>
APS T 504 <sup>1</sup>	504MB	399 <sup>95</sup>
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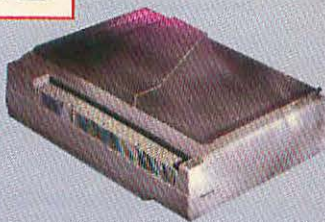


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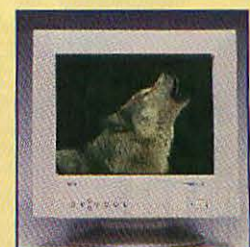
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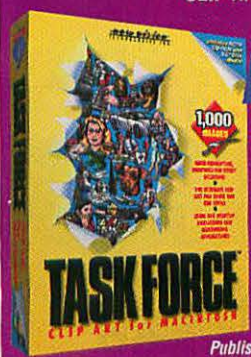
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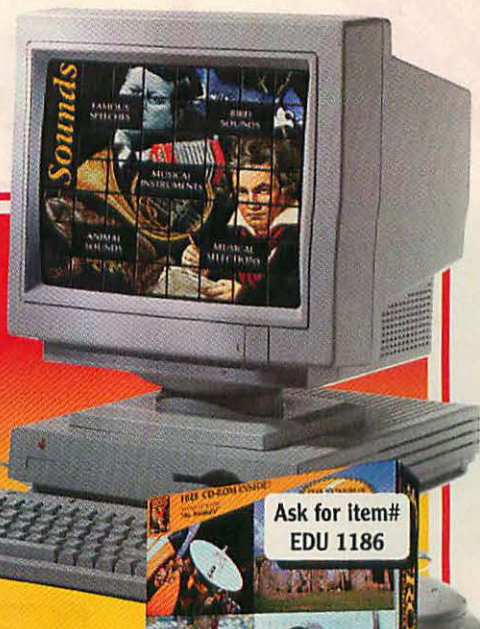
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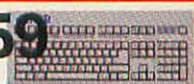
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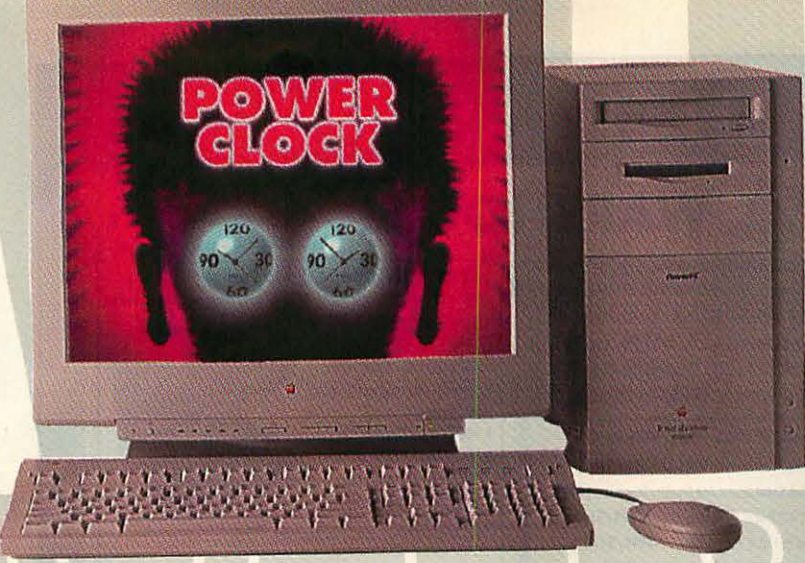


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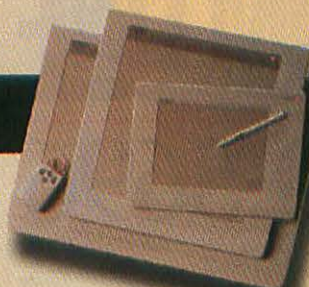
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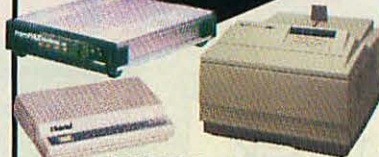
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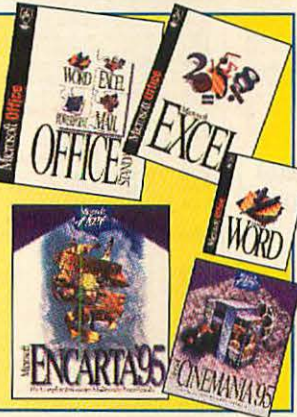
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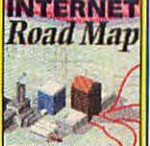
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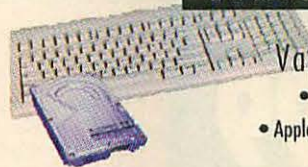
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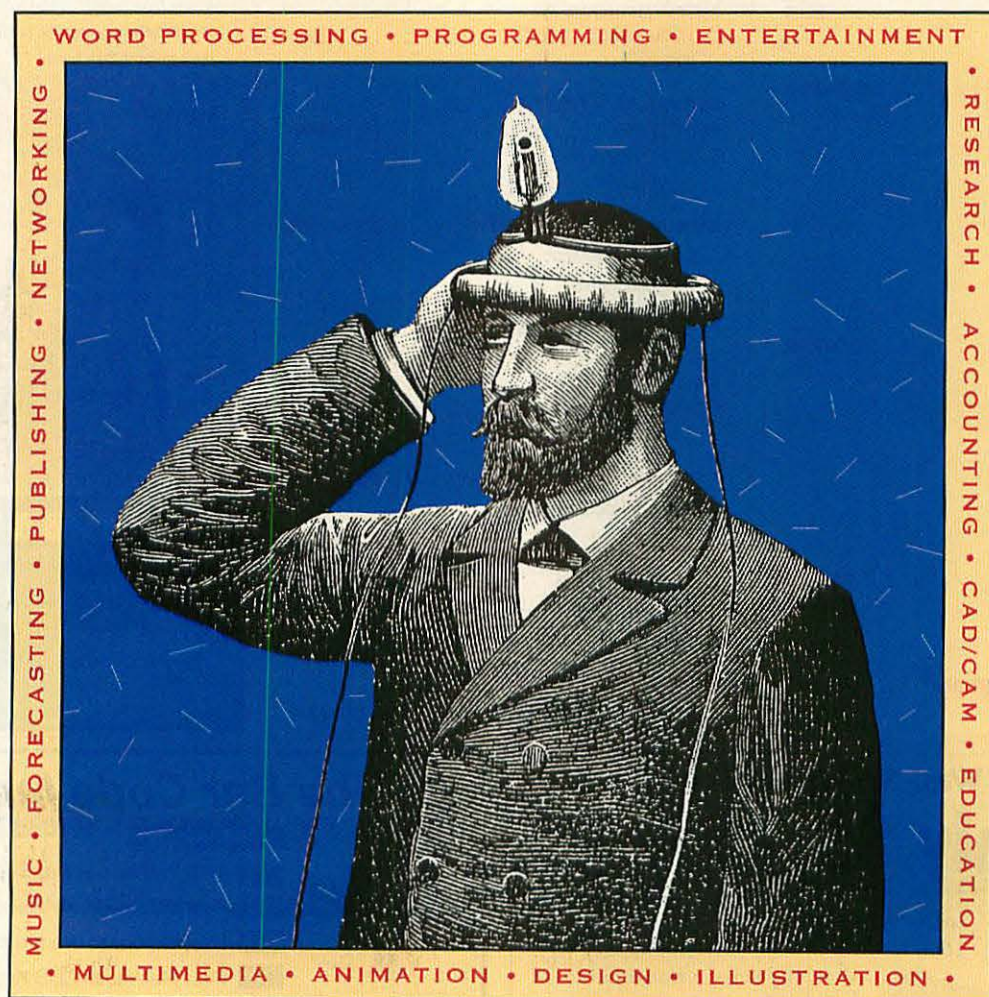
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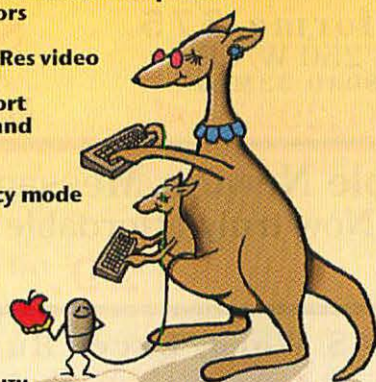
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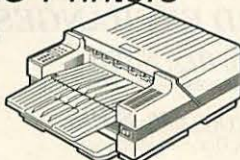
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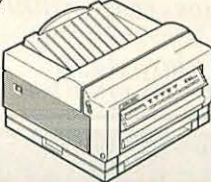
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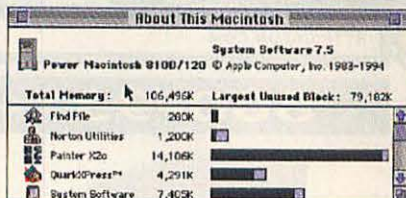
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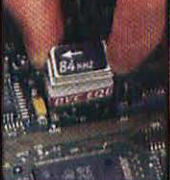
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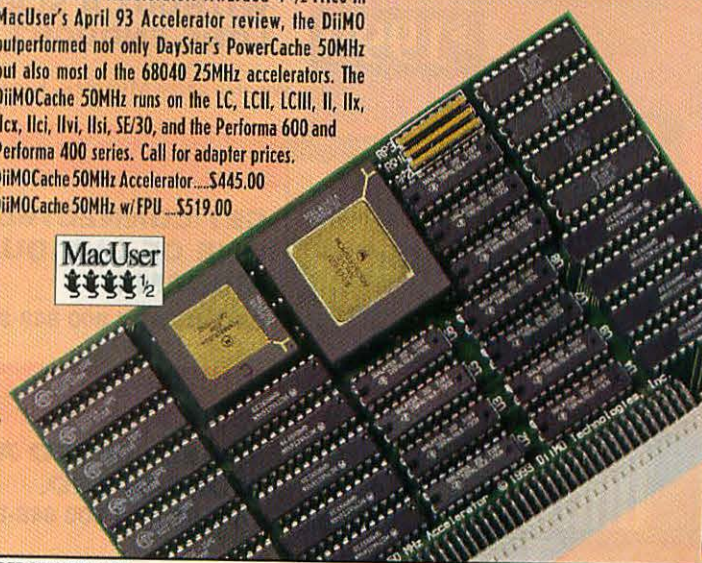
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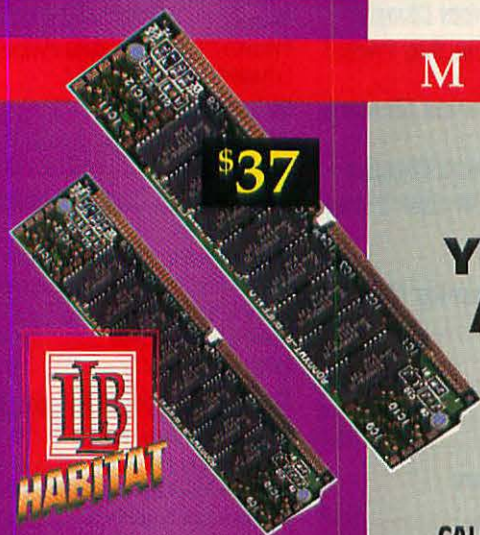
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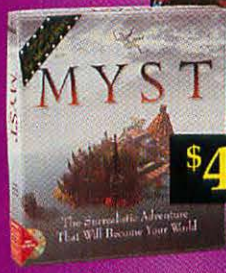
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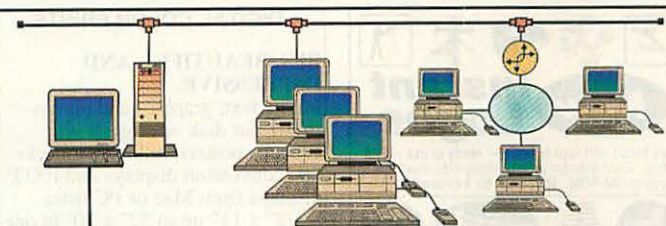


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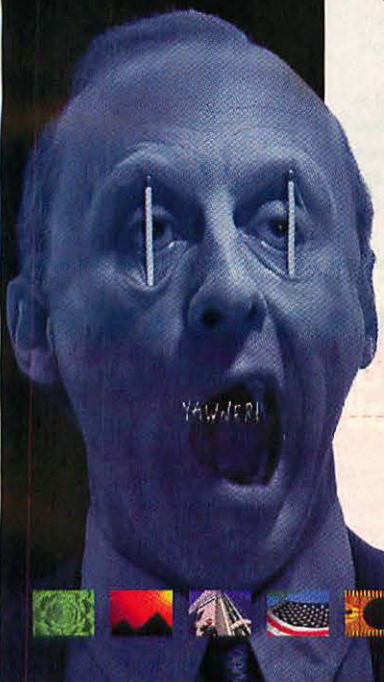
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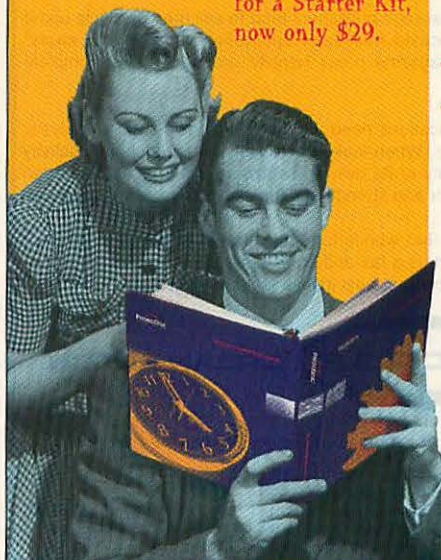
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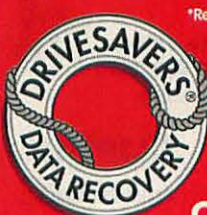
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# Cease and Persist

*What? Guy defends Microsoft?*

**B**ACK IN FEBRUARY 1995, JUDGE Stanley Sporkin of the Federal District Court disallowed the consent decree that had been reached between the Justice Department and Microsoft. This decree had consummated many years of antitrust investigation of Microsoft—with a whimper, some say. Here's what I'd like to say to Judge Sporkin.

## Dear Judge Sporkin:

Many Macintosh owners understand your reluctance to rubber-stamp the Justice Department's capitulation to Microsoft, but I think you should let the issue rest. I don't advocate this because Microsoft is innocent or because I like the company, but I do have my reasons.

First, interceding and severely punishing Microsoft would accelerate the wimpification of the personal computer industry, and wimpification is more dangerous to the industry than Microsoft is. Second, the seeds of Microsoft's demise have already been sown, so let the forces of nature take their course.

## Wimpification

Most of the people who are complaining about Microsoft's actions are wimps. They could have dropped out of Harvard, like Bill Gates, to write software and start a company. They didn't. They finished their education—even getting advanced degrees like MBAs (using the term *advanced* loosely)—and became corporate pukes. Now they're blaming Microsoft.

These guys aren't the downtrodden masses eking out a living. Most pay themselves millions of dollars per year, and if they worked for Microsoft, they would be as vigorously defending its actions as they are now decrying them. Frankly, they should fix their own product development rather than blame Microsoft. The last time I checked, filing a lawsuit was not part of the product-development process.

Though you may not agree, the purpose of competition is, ironically, to end competition—to tilt the playing field and elevate your company to a position where

other companies cannot compete. Microsoft's competitors tried to do the same thing, but they failed. Now their motivation is jealousy, not justice. For some reason, they believe that because they're dumb enough to give Microsoft their pre-release software, Microsoft should be dumb enough to do the same.

Microsoft deserves the rewards it's reaping. And any company that topples Microsoft deserves those rewards, as well. Sure, the government needs to protect citizens from a company with monopolistic powers that gouges people. But Microsoft's prices are reasonable—so reasonable that some companies claim they're too low. People can't have it both ways: if Microsoft charges too little, it's



unfair competition; if it charges too much, it's gouging.

As for products, with some exceptions Microsoft's are first-rate. There are millions of users of Microsoft products, and they aren't brain-dead automatons who will do whatever Bill Gates says. Consumers vote with their dollars. Witness, for example, Microsoft's failures in product categories such as flat-file databases (Microsoft File) and entry-level word processing (Microsoft Write).

## The Seeds of Demise

My second point is that the demise of Microsoft is already inevitable, so you

don't need to trouble yourself. I submit two pieces of evidence.

**Exhibit 1.** Word 6, a.k.a. "the bloody glove." What else but "demise" can anyone conclude about a company that ships a product like Word 6? There are only two explanations: Microsoft's testers were so stupid that they didn't notice how long it took to launch the thing, or Microsoft's management was so arrogant that it overrode the testers and shipped the bloody thing anyway. (I would guess the latter.) Either explanation screams "Demise."

**Exhibit 2.** The kind of people Microsoft is hiring. The current COO was hired from Procter and Gamble, the company that wrote the book on brand extension. And brand extension will start Microsoft down the slippery slope of mediocrity, because no company can be all things to all people. (Another company that tried to be all things to all people was IBM. I rest my case.)

Bill Gates wants it all: operating system, application software, online service, financial transactions, multimedia, and office machines. To get it all, you've got to have a lot of smart people. Microsoft already has more than its fair share of smart people, but Microsoft will go through a bozo explosion because it is now attracting the kind of people who want to work for a company that won't lay you off and looks good on your résumé.

## Closing Argument

Your Honor, the best thing you can do for the health of the personal computer industry is stay out of this. Let Microsoft have its day, because it deserves it. For America's sake, send out a message to the Bill Gates wannabes that if they create good products and provide good service, they will be rewarded. So please cease and let entrepreneurship persist. ■

GUY KAWASAKI's views are his own and only sporadically represent those of *Macworld*. He is president of Fog City Software and has investments in Apple, Bit Jugglers, Bookmaker Corporation, Global Village Communication, and Intuit. He can be reached at [kawasaki@radiomail.net](mailto:kawasaki@radiomail.net).



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